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# USSR Report

ENERGY

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## USSR REPORT

## ENERGY

No. 138

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## OIL AND GAS

### SOCIALIST OBLIGATIONS OF TYUMENGAZPROM ASSOCIATION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 7 Jan 83 p 2

[Unattributed article: "Socialist Pledges of the Workforce of the Tyumengazprom All-Union Industrial Association for 1983"]

[Text] Implementing the decisions of the 26th CPSU Congress pertaining to accelerated growth of natural gas production in Western Siberia, the workforce of the Tyumengazprom Association successfully met its socialist pledges to honor the 60th anniversary of establishment of the USSR and presented the nation's economy with 2.5 billion cubic meters of natural gas above target. Natural gas production increased by 20.4 percent over the preceding year.

The association's workers, engineers, technicians and white-collar employees enthusiastically and unanimously endorse the decisions of the November (1982) CPSU Central Committee Plenum, the points and conclusions contained in the report presented by CPSU Central Committee General Secretary Comrade Yu. V. Andropov, entitled "60th Anniversary of the USSR," and are adopting higher socialist pledges for 1983.

They pledge to obtain maximum natural gas production incremental growth, 36.5 billion cubic meters, through more efficient utilization of existing and accelerated movement on-stream of new production capacity in the Urengoy gas condensate field, general dissemination of the experience of production innovators, further strengthening of labor discipline, and improved organization of labor. They pledge to give the nation's economy 1.6 billion cubic meters of natural gas above target and to achieve the labor productivity growth targeted for 1984.

They pledge a cooperative effort with construction workers on the trunk natural gas pipelines to bring on-stream ahead of schedule the line facilities proper of the Urengoy-Pomary-Uzhgorod natural gas pipeline.

They pledge to intensify economy measures pertaining to fuel-energy and other material resources and to save 70 million kilowatt hours of electric power and 48,000 gigacalories of thermal energy. They pledge to generate 4 million rubles of above-target profit by reducing production costs. They pledge to generate savings of 3.5 million rubles from adoption of inventor and efficiency innovator proposals.

They pledge to complete for occupancy 220,000 square meters of housing, children's preschool facilities accommodating 940 children, 4 schools and a polyclinic. They pledge to boost the job qualifications level of 4900 workers and to train 2600 new workers of leading occupational categories.

They pledge to increase production of agricultural goods on subsidiary farms and to produce 25 kilograms of meat, 44 kilograms of milk, 60 eggs, and 12 kilograms of hothouse vegetables per employee.

The association's workforce assures the Leninist CPSU Central Committee and Soviet Government that it will continue in the future working persistently to implement the decisions of the 26th CPSU Congress and the November (1982) CPSU Central Committee Plenum pertaining to accelerated exploitation of Western Siberia's natural-gas resources and to strengthen our country's economy.

We call upon the workforces of the gas industry and the Ministry of Construction of Petroleum and Gas Industry Enterprises to expand even more broadly socialist competition to improve work efficiency and quality and to achieve ahead-of-schedule fulfillment of the plan-specified targets for 1983 and the five-year plan as a whole.

The socialist pledges were discussed and adopted at meetings of the association's workforces.

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## OIL AND GAS

### CEMA NATIONS COORDINATE RESEARCH ON FUEL, OIL ADDITIVES

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 11, 1982 pp 39-40

[Article by Erhard Verner, manager of the KOTs [Coordination Center] on the Problem, "The Study and Synthesis of Additives to Fuels and Oils and the Mastery of Processes for Obtaining them": "Additives to Fuels and Oils--an Important Target of Collaboration"]

[Text] Almost all branches of the economies of CEMA member nations need fuel and high-quality lubricating oils. In the near future the requirement for this output will increase both qualitatively and quantitatively. Even today the requirements for these products have risen so much that they cannot be satisfied through the natural components of crude-oil products. Modern lubricating materials should be manufactured from base oils plus the appropriate specific additives or packages of additives. Purposeful improvement of the operating properties of oils and, as a result, fulfillment of the demand of all the consuming branches of the economy are possible, thanks to their use alone. Since expenditures on solution of problems in the given field (synthesis of additives, acquisition and selection of raw materials, production technology, testing, and so on) are substantial and not within the powers of each country individually, in June 1972 the 36th Session of the CEMA Standing Commission on Collaboration in the Field of the Oil and Gas Industry created a Coordination Center on the matter, "The Study and Synthesis of Additives for Fuels and Oils and Mastery of the Processes for Obtaining Them."

The Coordination Center has the basic tasks of:

developing programs of scientific and technical research and organizing collaboration in the research tasks called for in this program, and also monitoring their fulfillment;

making up forecasts on the problem and preparing proposals for expanding and intensifying collaboration;

developing proposals on the possibilities of using the results of completed scientific-research and on introducing the results more rapidly into production; and

organizing scientific meetings and symposia on questions associated with carrying out the programs.

Eight CEMA member nations--the Bulgarian People's Republic, the Hungarian People's Republic, the GDR, the Republic of Cuba, the People's Republic of Poland, the Romanian Socialist Republic, the USSR, and the Czechoslovak Socialist Republic--signed the agreement to create the Coordination Center and are coordinating scientific and technical research on the given problem, thereby making a contribution to the solution of important national economic tasks in the area of the study and synthesis of additives.

Collaboration within the framework of the Coordination Center is accomplished on the basis of scientific and technical research programs and of annual and two-year plans for scientific and technical research that have been developed and approved by the above-mentioned empowered council, which has jurisdiction. In fulfilling scientific-research tasks under scientific and technical research programs and under national and international requirements, much attention is being paid particularly to the interrelations of the basic and applied scientific research and to evaluation of the operating properties and to production technology, with a view to providing for the greatest effectiveness of the scientific research that is performed and then introduced into production.

In the framework of fulfilling the programs for 1972-1980, the conclusion can already be drawn that, as a result of the purposeful work of the countries that are members of the Coordination Center, 58 scientific and technical research operations have been completed. It has been possible to introduce these results partially into semi-industrial or industrial production. Thus, an analysis of fulfillment of the plan for scientific and technical research for 1981 indicated that 10 tasks were introduced into semi-industrial and 3 tasks into industrial production. Moreover, it was possible during this period to unify 7 integrated methods for testing petroleum product, and 36 particular tasks were solved in the area of fundamental research work on a study of the mechanism of additive action.

In 1976 the first bilateral agreements, with refined programs of operation, were concluded with a view to solving the agreed tasks in accordance with the division-of-labor principle. A result of this bilateral scientific and technical collaboration is the integrated corrosion inhibitor MOPL-1. At the 53d Session of the CEMA Standing Commission on Collaboration in the Field of Oil and Gas Industry (October 1980), it was observed that, as a result of the scientific and technical research conducted within the framework of the Coordination Center, it was possible to develop and introduce high-quality additives into production. However, the time between the conclusion of scientific-research work and its introduction into production is too long in all member countries that belong to the Coordination Center. It is necessary here to exert all efforts to assure that the effectiveness of scientific research that has been completed will be turned more rapidly to use in the economies of CEMA member nations. In particular, it is extremely necessary to energize the development and introduction of such types of additives that are important for production purposes, such as sulfonates, alkylsalicylates, alkylphenols, ash-free detergent and dispersant additives, additives for improving temperature and viscosity properties, and depressor additives.

A necessary prerequisite to execution of the tasks that face the Coordination Center is their specific agreement with the plans for the corresponding higher national organizations and the MKhT, Internefteprodukt. The draft of an integrated program for the science-engineering-production-marketing cycle on the problem of additives to fuels and oils that was developed jointly with Internefteprodukt and the CEMA

Secretariat can be considered a step in this direction. Only by joint work, that is, with the help of production specialization and cooperation, is it possible to solve the problem, which right now is very important, of obtaining raw materials for additives, since these products are, for the most part, being imported from nonsocialist countries. The Coordination Center is paying great attention to solving the problem of replacing and eliminating such imports.

In order that the tasks for conducting joint scientific and technical research that face the Coordination Center may be carried out in the long term, collaboration should fulfill the following basic requirements:

a rise in the effectiveness of the work, by realizing scientific and technical research on a trade basis, using international division of labor;

provisions for the more rapid introduction of the results of completed scientific research into production on the basis of close and supportive coordination with the national economic plans of the CEMA member nations, which is mandatory in nature;

a rise in effectiveness through the sale of licenses and through scientific and technical results;

the working out of analyses and trends in developing additives on a world scale; and

the creation of temporary international collectives of specialists for solving first-priority scientific research tasks.

As a basic prerequisite for solving these problems, there remains, however, the all-encompassing solution of the raw-materials problems, which are first priority in the countries that belong to the Coordination Center.

These are, in our view, the way for improving scientific and technical collaboration and for increasing production efficiency in the problem of the research and synthesis of additives.

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## OIL AND GAS

### KASPMORNEFT' OFFSHORE RIG PROGRESS REPORT

Baku VYSHKA in Russian 22 Oct 82 p 2

[Article by O. Nechipurenko, Caspian Sea, Field imeni 28 April: "Penetrating to Great Depths"]

[Text] In a speech at an official ceremony awarding the Order of Lenin to the Azerbaijan SSR, Comrade L. I. Brezhnev, discussing problems facing this republic's oil and gas production people, noted that the oil workers of Azerbaijan, who possess fine traditions of innovation, are capable of accomplishing these tasks.

This is confirmed in particular by the shock-work labor by the crew of "Kaspmorneft'," the Caspian's first semisubmersible drilling rig.

VYSHKA has reported on several occasions the difficulties which its crew has experienced. This was the first rig of its type, and considerable efforts were required to surmount these difficulties.

They have established a new record: for the first time in Soviet drilling history an exploration well has been drilled to almost 4000 meters at a sea depth exceeding 100 meters.

Everybody worked hard for almost an entire year to achieve this goal -- from the top specialists of the Kaspmorneftegazprom Association to the rank-and-file members of the drilling rig's crew.

"When we had to pull from the hole, due to an unforeseen complication, the casing string which had just been run into the hole," relates deputy tool pusher, young engineer Vladimir Garakyan, "driller Aleksey Rybalkin's shift, for example, tripped out approximately 100 joints, which under normal conditions would seem inconceivable."

We could cite a great many examples of labor heroism by the members of the "Kaspmorneft'" crew. As a result the well was completed more than 2 months ahead of schedule, at a savings of approximately 4 million rubles. An intelligent combination of highly-efficient type UISM drill bits, which boast improved resistance to wear, with a properly selected bit loading, and skillful

application of an improved system of drilling mud processing, plus other innovations, also played an important role in the overall success.

I was shown log records covered with recording-stylus red peak-and-valley lines -- geophysical well data attesting to the great promise of the beds which had been drilled through. Some of them, the Kalinskaya series, for example, had been reached by drill in this area for the first time. Their depth was much less than the geologists had assumed. In particular, this already made it possible to revise the drilling schedules for the wells being drilled in the vicinity, from the country's first deep-water platform.

The geological results, however, do not exhaust the significance of this well for the future development of oil and gas production at great sea depths.

In spite of their comparatively brief time on the job, the men of the rig's crew have already amassed a great deal of advanced know-how.

We must state that successful dissemination of the experience and know-how obtained on the "Kaspmorneft" rig has made a great contribution to the fact that today the crews of almost all floating rigs are successfully meeting their socialist pledges made in honor of the 60th anniversary of establishment of the USSR.

Soon a new and critical phase will begin for "Kaspmorneft" -- well testing for productivity. The rig carries complex equipment for this purpose, including an oil and gas separation, spraying and combustion systems. Use of this equipment prevents environmental pollution.

"This system makes it possible to neutralize more than 1000 tons of test production obtained from a well in 24 hours," I was told by the deputy chief of the production department at the Kapmorneftegazprom All-Union Industrial Association, Salekh Abbasov. "We tested it out in advance, but such an operation has not yet been performed on a full-scale basis in the Soviet oil and gas industry. I am confident, however, that the rig crew will do a fine job."

Inspired by counsel and instructions by Comrade L. I. Brezhnev given at an official ceremony in Baku as well as by the kind parting words which Leonid Il'ich gave the crew of the 'Shel'f-2" upon visiting that rig, the men of the "Kaspmorneft" are today enthusiastically discussing new tasks facing offshore oil and gas workers in the Caspian and are seeking new reserve potential and capabilities to achieve successful plan fulfillment.

"The head of the Communist Party and Soviet State wished the crew of the 'Shel'f-2' success in meeting their pledges," stated Bagir Khanlarov, one of the rig crew members. "These kind words call upon us to work even better, without delays. I must state that a major obstacle in our work is the present system of supplying rigs, whereby all floating rigs are supplied by only two boats, for five drilling rigs are presently operating just in the Field imeni 28 April. I believe it would be a good idea to have a big mother ship here, from which other, smaller boats would deliver supplies to each rig as needed."

"Or take a specific question: how shall we drill the next well?" rig mechanic Vladimir Zaytsev chimed in. "For spare parts for the rig, oil hoses, pistons, cylinder liners and many other items are running short. We must get moving and resolve the problem of placing orders for these items with suitable enterprises, and scientific research and design organizations must prepare the required technical documentation for this. We must also get serious and proceed with building a maintenance facility for floating rigs. We will have 12 of them by the end of the five-year plan."

In the opinion of the oil exploration workers, there are many other problems which also require immediate solution. These include the need for efficient utilization of the diving equipment available on semisubmersible rigs, equipment without which it is impossible to do a high-quality job of drilling and underwater technical jobs, as well as the earliest possible manufacture of production equipment for wells drilled with these rigs. They also feel that other extremely important matters include those connected with development of performance standards for various operations which are new in offshore oil and gas drilling, operations connected with putting the rig precisely on location and operation of floating offshore drilling rigs.

The workers of the "Kaspmorneft'" rig are approaching the 65th anniversary of the Great October Revolution and the 60th anniversary of establishment of the USSR with good performance results. Carrying out the advice and instructions of Comrade L. I. Brezhnev and inspired by the CPSU Central Committee Appeals in connection with the October celebration, they are filled with resolve to increase their contribution toward strengthening this country's fuel and energy potential.

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## OIL AND GAS

### KEDROVYY -- NEW OILFIELD TOWN IN TOMSK OBLAST

Moscow IZVESTIYA in Russian 2 Jan 83 p 2

[Article by IZVESTIYA correspondent L. Levitskiy, Tomsk Oblast: "Town of Kedrovyy Established"]

[Excerpt] Oil industry people have also long been attracted by oil deposits far south of Strezhevoy, in the so-called Nyurolskaya basin.

"Sixteen fields have already been discovered there. Unquestionably there will be additional finds." This statement by I. Ivanov, head of the Tomskneftegazgeologiya Association, defines the possibilities of the oblast's third oil producing area.

How can one tap mineral wealth in the middle of swamps which are as large as some seas? It seems that even rivers, which have helped out oilmen time and again in the past, have not dared enter the area! But the new area also had its plus points. The Luginetskoye field is only about 200 kilometers from a pump station on the Aleksandrovskaya-Tomsk-Anzhero-Sudzhensk oil pipeline. There is also a large power substation there. By Siberian measure, 200 kilometers is not that great a distance.

In 1980 the decision was made to build a pipeline and power transmission line to Luginetskoye. In a year's time construction crews laid 30 kilometers of pipe and filled it with crude oil for temporary storage. The job was scheduled for completion in December 1984. But this schedule was not to the liking of the oilmen and construction people. Does it make sense completely to freeze funds, assets, and equipment allocated for a project and to keep from exploiting mineral resources for an extended period of time? The workforces of the Tomskneft' Association, the Tomskgazstroy Trust, the territorial construction administration, and the Tomsk Elektroset'stroy Administration pledged to begin bringing fuel from the new area without additional resources and two years sooner than scheduled -- by the 60th anniversary of the USSR. The party oblast committee bureau and the oblast executive committee supported the northerners' initiative. Construction workers, land reclamation people, and the aviators of Khimstroy and Tomlesstroy came to their assistance. The line route to Luginetskoye became a project of paramount importance for all servicing branches as well.

Siberians are accustomed to self-sacrifice on the job. But even Siberians are amazed at the resourcefulness and courage of the power line construction crews, who built a 180 kilometer power transmission line in less than a year and built a substation at the oilfield. Electrical workers were able to erect the towers in summer, during the "dead season," and thus gained time. They put together the towers in an assembly yard, and helicopter pilots delivered the sling-loaded assembled towers with a jeweler's precision to the tiny concrete footings among the peat bogs. A total of 1300 runs were required. On some days the sky fairly buzzed with helicopters.

Construction of oilfield lines and facilities was also proceeding at a rapid pace. The residential community for the oilfield workers contained all necessary services: a good meal facility, a store, a medical facility, and baths. As they say, the housing is temporary, but the conveniences are permanent.

The Tomsk people pledged to produce Luginetskoye crude by the 60th anniversary of the USSR. And the day of the Communist subbotnik [unpaid mass work day] dedicated to our national holiday became the birthday of a new oil producing area in this oblast.

And not far from the drilling location, loggers are already clearing the right-of-way for a power line to the Kalinovoye field, and beyond it to the future oilfield worker base town of Kedrovyy [stone pine]. Its name is portentous as a symbol of unity between man and nature, an endeavor to combine industrial exploitation with a conservationist's attitude toward the taiga and its inhabitants.

The town is being built on a beautiful site -- clean birch groves and large forests of the king of trees, the stone pine. Not far from the site there is an 18 square kilometer crystal-clear lake teeming with fish. It is unique in the oblast. And the climate presents a pleasant puzzle -- the winter is warmer here and the summer is longer and sunnier than in Tomsk, almost 300 kilometers to the south. On the New Year's holiday the people of Kedrovyy had words of praise for those who chose this as the site for the town. They firmly believe that it will be distinguished both by beauty and a friendly atmosphere. A competition has been announced, for the best town layout. By 1990 it will have a population of 30,000. They will be taking riches from lands which have received an intelligent, caring master.

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## OIL AND GAS

### TOMSK OIL WORKERS EXCEED QUOTA

Moscow IZVESTIYA in Russian 29 Oct 82 p 1

[Article, published under the heading "October Reports," by IZVESTIYA correspondent L. Levitskiy, Tomsk Oblast: "Oil Workers' Contribution"]

[Text] The Tomsk oilfield workers have produced 70,000 tons of crude above target. Pledges in honor of the 60th anniversary of establishment of the USSR have been met ahead of schedule.

I have just returned from Strezhevoy, Tomsk Oblast's oil production center. I saw how hard all workforces are working and how persistently they are fighting for each additional ton of crude. Maintaining a high rate of production is not easy. Its sources lie in the increased organization of the entire oilfield production process.

"Just as we promised, we met ahead of schedule the targets for the first two years of the five-year plan," stated drilling rig foreman T. Fattakhov, leader in the drilling crew competition. "By year's end we shall have drilled at least 75,000 meters. This will be the first time such a high figure has been achieved in the Tomsk fields. But others have also made a contribution to our success: construction workers, rig-building crews, and geophysicists."

This leading drilling rig foreman is right. The support services have become more efficient in performance and structure, planning of the entire process has improved, and rate of drilling has also increased. Four more brigades in the Strezhevoy Administration will complete their targets for the first two years of the five-year plan by 7 November.

Tomskneft' Association economists have cited the following figures. Last year 421,000 meters were drilled in the first three quarters, while this year the figure is already 459,000 meters. This is a substantial increase. And this figure does not include rigs operated by the Belorussian Administration, operating by the watch-expedition method. This workforce has become fully accustomed to the Siberian conditions and is now practically keeping pace with the local drillers. The administration has drilled more than 200,000 meters -- its year's program has been completed.

The inventory of producing wells has increased by 204 since the beginning of the year. At the same time the Siberians realize that it makes better financial sense to invest funds and efforts into increasing well yields than to keep boosting volume of drilling. And the oilfield workers view improvement in work quality as their principal reserve potential: oilfield renovation activities are proceeding at full speed. Remote monitoring is being added to the remote control system. Wells in the largest field -- the Sovetskoye -- are linked to a central control console. Now when the slightest problem occurs, crews are immediately alerted and rushed to the site. Optimal well flow rates are figured by computer, and computers help select the requisite equipment. Expansion of the road network and uninterrupted supply of electric power -- a power transmission line has been run north from Tomsk -- are good preconditions for efficient exploitation of mineral resources. Therefore one is particularly pleased with the success of the crews working in the remote Vasyugansk fields. Employment of the duty-shift method here has saved the country tens of millions of rubles. Thanks to it, oil production in the oblast has now risen by 5 percent.

The Tomsk oilfield workers are today working on development of the new Luginetskoye oilfield area. A pipeline and a power transmission line have already been constructed across the taiga. Drilling crews are working hard on the job. All have a common goal -- to produce the first crude from this distant oilfield area on the subbotnik [unpaid mass work day] dedicated to the 60th anniversary of the USSR. Joyous news has just arrived: site clearing has begun, and the foundation has been poured for the first building in the future oil workers' town. The plans for this town incorporate all the best things that have been achieved in the young towns along the Ob.

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## OIL AND GAS

### DAULETABAD GAS FACILITY COMPLETED

Moscow IZVESTIYA in Russian 30 Dec 82 p 3

[Article by IZVESTIYA correspondent V. Gavrichkin, Turkmen SSR: "Bountiful Heat From Dauletabad"]

[Text] The first production facility in the largest gas field in the Kara Kum has come on-stream half a year ahead of schedule. Natural gas is now flowing into the Central Asia-Center trunk natural gas pipeline.

Just a month ago the Dauletabad industrial site was nothing but a pile of disturbed sand and what at first glance appeared to be disordered heaps of various equipment. It did not seem that the plant for processing natural gas produced in the new field would be ready very soon: in conformity with existing standard timetables, 36 months had been designated for its construction. But the workforces of the Order of the Red Banner of Labor Shatlykgazstroy Trust, the Sredazneftegazmontazh Administration and a number of other subcontractor organizations decided otherwise. They pledged to bring the facility on-stream ahead of schedule, although it had been less than a year since a field settlement had been established there. And now the facility's processing towers and buildings have risen above the desert, sparkling in their silver paint, bristling with a complex interweave of pipes. The power and water lines are in. Gas flow from a dozen wells was brought to the gathering point.

"Success was ensured by a strong desire to make our contribution to the jubilee year performance report, the experience and know-how of the construction workers, as well as precision organization," stated S. Lidiker, manager of the Shatlykgazstroy Trust. "Each day a performance task, scheduled literally by hour, would be specified for each construction site section. The brigades, adhering to closely coordinated schedules, worked in relay fashion, giving the 'green light' to each succeeding stage of the job."

People worked in a genuinely selfless manner. Day after day the construction project radio newspaper listed the names of the very top performers. All timetables were surpassed by the brigades of USSR State Prize recipient V. Kanashchenkov, L. Pevtsov, V. Azaryan, N. Pogosov, V. Geryshev, and G. Orbinskiy. Pipe fitter-electrician V. Voronin, arc welders F. Takhmezov, O. Salmanov, and S. Kotov, electrical equipment installer V. Lobanovskiy, sideboom operators A. Ramazanov and A. Ginatulín, as well as dozens of other

leading-performance workers distinguished themselves time and again in the competition.

And finally the day came when the first gas flare ignited above Dauletabad, illuminating the desert. Its powerful, wind-fluttering flame seemed to symbolize the entire work energy in every section on the construction project, which had entered the most intense stage prior to plant start-up. At this time the immense length of the new natural gas pipeline running from Dauletabad was still interrupted at two points: at kilometer 115, where the connection to the Central Asia-Center trunk pipeline had already been made by the Shatlyk originating compressor station buildings, and where only the final weldup remained to be done; and on the banks of the Kara Kum Canal, across the bottom of which they would be running inverted siphons.

...The specialists of Specialized Underwater Operations Administration No 2 of the Ufa Vostokpodvodtruboprovodstroy Trust have long had the reputation of being experts at crossing water barriers. The trust's brigades have accomplished approximately 70 crossings this year alone. But the Kara Kum Canal, across which it was necessary to run a 380-meter inverted siphon, as well as a backup natural gas line and two parallel condensate lines, presented many complex problems. The powerful current and the fine sand will quickly fill in a trench dug across the bottom of the canal, while tractors and sidebooms would become stuck in the loose dunes along the banks, helplessly spinning their tracks. In addition, they were short of equipment. In order to avoid bringing in equipment from a distance, and in order to save time, it was decided to make do with minimum equipment. They therefore attached to the pipe only a portion of the heavy weighting anchor rings, with the remainder to be attached in place.

They strung the backup line across the canal on 10 November without any particular difficulties. Laying of the main inverted siphon began on the morning of 21 December. Administration chief engineer L. Aleksandrov waved a white flag from his command post atop a high dune. The signal to commence the assault was passed on by his assistants, and the mighty sideboom tractors, picking up the 800-ton string of pipe, and proceeded to move forward in unison. Tractors were pulling the attached cable from the right bank. It was necessary to halt every 15 or 20 meters -- the sideboom tractors were getting stuck in the sand. The end of the string was only about 50 meters from the far bank when the command came: "Hold it!"

"We are at the most critical moment," explained I. Zakharov, the underwater operations trust chief engineer. "If the halt is prolonged, the current will bury the pipeline...."

The hard work continued during the remainder of the day, all night, and all the next morning -- they were attaching the last weights. In actual fact there was no risk involved. Procedures were following calculation and purpose: to ready as quickly as possible the remaining part of the inverted siphon for laying in place. At 1500 hours on the following day the end of the pipe string slowly crept up the right bank. The pipeline connection was accomplished. Crews proceeded with testing the pipe from the beginning of the line to kilometer 115.

The USSR Ministry of Construction of Petroleum and Gas Industry Enterprises and the republic construction project headquarters succeeded in utilizing the main reserve potential on construction of the Dauletabad facility: they were able to unite in a practical manner the efforts and interests of the client -- the Turkmengazprom All-Union Production Association; the general contractors -- the Shatlykgazstroy and Sredazneftegazstroy trusts; as well as all the many subcontractor organizations and suppliers. Hence the precision in meeting schedules, coordination of work performance, installation of equipment in large modular units at a high degree of completion, utilization of bold engineering solutions, mobility and efficient flexibility of construction subdivisions, effective competition among subcontractor enterprises, and a show of responsibility on their part.

And now facilities have been started up at Dauletabad, valves have been opened, and a powerful flow has filled the steel bed of the new river of gas in the Kara Kum. The first cubic meters of "blue fuel" have reached the customer.

3024

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## OIL AND GAS

### BRIEFS

WINTER SUPPLY TO ARCTIC RIGS--Naryan-Mar, Arkhangelsk Oblast--The first winter supply roads across the Nenets tundra have been plowed through by powerful tractors. Pushing forward about a hundred difficult kilometers, the experienced drivers reached a remote drilling rig and delivered supplies to geologists who are prospecting for oil and gas by the shores of the Arctic Ocean. Even long-time residents of the Arctic are surprised at such an early onset of extreme cold. Because of this, many cargo ships of the Northern Marine Navigation Company were unable to reach the shore. They are now counting on ice roads across the tundra. Experimental early runs have demonstrated that the correct route was selected. Work on the drilling rigs will not shut down. It has been decided to haul at least 60,000 tons of various supplies along the winter tundra roads this winter. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 26 Oct 82 p 1] 3024

ACHINSK REFINERY START-UP--Krasnoyarsk--The first test batch of product has been obtained at the Achinsk Oil Refinery. The furnaces of the lead section of the oil refining plant were fired up for the first time at the beginning of December. Operating personnel, working together with setup crews, proceeded with equipment testing and adjustment. Primary crude oil processing facilities are now 100 percent ready. [By IZVESTIYA correspondent] [Text] [Moscow IZVESTIYA in Russian 16 Dec 82 p 1] 3024

NEW PIKHTOVOYE OILFIELD--Perm Oblast--A new deposit of "black gold" -- the Pikhtovoye oilfield -- has been added to the geological map of the Western Urals. The very first well, drilled by the brigade of rig foreman A. Churin, has produced a flow of crude which exceeds by a factor of 15-20 the average yield for Perm Oblast. [By SOTSIALISTICHESKAYA INDUSTRIYA correspondent V. Ukolov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 27 Nov 82 p 2] 3024

TOMSK DRILLING RECORD--Tomsk--The brigade of F. Shakirov, of the Strezhevoy Administration of the Tomskneft' Association, has accomplished more than 50,000 meters of operational drilling. No workforce has ever achieved such productivity in the Vasyugansk area. After completing the pledges they had made for the second year of the five-year plan, the drilling crews added to that an additional 23,000 meters. The oilfield workers of the Pionerskoye field, where this workforce is employed, have taken up the drillers' relay baton and have completed the annual plan ahead of schedule. [By SOTSIALISTICHESKAYA INDUSTRIYA correspondent A. Lyakhov] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Dec 82 p 1] 3024

PRODUCING SOLUBLE OILS--The Azerbaijan Scientific Research and Design Institute has developed a new method of obtaining soluble oils. The initial components are readily available, inexpensive, and are produced in sufficient quantity by Soviet industry. This method can be utilized in the oil producing industry, oil refining, food processing, and other industries. Savings from employing this new method, figured per thousand tons of finished product, will amount to 236,000 rubles per year. [Text] [Baku VYSHKA in Russian 14 Nov 82 p 4] 3024

DRILLSHIP STATIONKEEPING--Scientists and specialists at the Gipromorneftegaz Scientific Research and Design Institute are proposing a new device for monitoring a drillship's position in relation to an undersea wellhead. The design of this new device makes it possible to compensate for heaving of the drillship. A rough calculation has shown that operation of a drillship with monitoring of position relative to the wellhead for depths of up to 300 meters will produce annual savings of 20 million rubles. [Text] [Baku VYSHKA in Russian 14 Nov 82 p 4] 3024

KUYBYSHEV ABOVE-TARGET CRUDE--Kuybyshev--If all the above-target crude produced this year by the workforce of the Kuybyshevneft' Production Association were pumped into tank cars, more than 40 heavy trains would be required to haul it. Producing an additional 130,000 tons of crude, the oil workers of the Middle Volga met ahead of schedule their pledge for the jubilee year. And the main element in achieving this success was effective competition among drilling crews, rig builders, well workover and maintenance crews in honor of the 60th anniversary of establishment of the USSR. The workforces of the Pervomayneft', Sergiyevskneft', and Chapayevskneft' oil and gas production administrations are working particularly efficiently. They are rapidly developing new fields and increasing production in old fields. [By SOTSIALISTICHESKAYA INDUSTRIYA correspondent A. Vorob'yev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 17 Oct 82 p 1] 3024

ABOVE-TARGET BASHKIR OIL, GAS--Ufa--Already 2 months ago the petroleum industry workers of the Bashkir ASSR met their annual pledges for above-target production of crude oil, natural gas, and well drilling. In November they produced an additional 30,000 tons of "black gold." This year they have above-target produced a total of 275,000 tons of crude, 34 million cubic meters of natural gas, and have drilled 41,000 meters of borehole. The first in the Bashneft' Association to meet the annual borehole drilling plan was the workforce of the Ufa Drilling Operations Administration. The drilling brigades of Hero of Socialist Labor T. Vil'danov, N. Seregin, A. Latypov, N. Aslayev, V. Repalov, and others reported ahead-of-schedule fulfillment of targets for the first two years of the five-year plan and annual targets. The association's workforces have decided to stand labor watch with redoubled energy on All-Union Communist Subbotnik [unpaid mass work day] and to achieve maximum productivity. On 18 December, in addition to the plan-specified targets, they will drill and bring into production an additional well, and produce 1000 tons of above-target crude. Oilfield workers will transfer ten of thousands of rubles into the fund of the five-year plan. [Text] [Moscow IZVESTIYA in Russian 4 Dec 82 p 1] 3024

**AZERBAIJAN DOWNHOLE MAINTENANCE**--Baku--The workforce of Section 6 of the down-hole well maintenance shop of the Leninneft' Oil and Gas Production Administration, led by Senior Foreman Tel'man Kafarov, has turned over to the production people this year 200 wells in addition to the plan-specified target and is already working on the schedule for the end of the year. Success has been achieved due to good organization of labor by the maintenance people, efficient utilization of advanced methods, and rational use of work time. As a result the time required per repair operation was reduced by more than 5 hours, which has made it possible to save approximately 1 month of work time. Labor competition among the section's workforces is led by the brigade of Foreman Rakhab Akhmedov -- it is credited with more than 40 above-target repair operations. The performance of these leaders is being matched by the brigades of Agamali Khalilov, Karlen Allakhverdiyev, Sadratdin Shakhmuradov, and Gyul'baly Tairov. They have decided to perform maintenance on an additional two wells on Communist subbotnik day in honor of the 60th anniversary of establishment of the USSR. Marching in the competition vanguard are maintenance operators Isa Aminov, Boris Ionesyan, Zafit Aliyev, Shekerkhan Kaflanov, and Ikhtiyar Gasanov, hoist operators Yasha Nasibyan, Karlen Bargamanov, Gardashbala Aliyev, Nikolay Filimonov, and others. The workers of this section adopted higher socialist pledges in honor of the USSR jubilee: to perform repairs on 220 additional wells above and beyond target. [By VYSHKA volunteer correspondent A. Orbelyan] [Text] [Baku VYSHKA in Russian 19 Nov 82 p 3] 3024

**SURGUT WELL DRILLING**--The multiethnic workforce of Surgut Drilling Operations Administration No 2 has drilled 560,000 meters of oil wells in 1982, exceeding the plan-specified target by 55,000 meters. Borehole drilled per brigade has increased by 9000 meters over last year, totaling 93,000 meters. The oilfield workers of Surgut have been handed over 220 wells of a quality of good and excellent -- 18 more than targeted. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 52, Dec 82 p 7] 3024

**NEW RECTIFICATION COLUMN**--Rectification columns are used in the oil refining, petrochemical, and chemical industries for distillation of complex mixtures, in particular crude oil or residual oil. Presently used columns fail to ensure precise separation of complex mixtures and require considerable consumption of fuel. Specialists at the Baku Oil Refinery imeni A. Karayev have designed a new rectification column in which these shortcomings have been corrected. The design of the new unit makes it possible to reduce the temperature of the crude oil (residual oil) by 40-50 percent in comparison with existing equipment. This decrease in heating temperature leads to reduced stress in the furnaces, fuel savings, decreased energy outlays and reduced discharge of polluting gases into the atmosphere. Anticipated savings just from reducing fuel consumption in a single unit amount to 53,400 rubles per year. [Text] [Baku VYSHKA in Russian 14 Nov 82 p 4]

**NEW WELL PUMP**--Scientists and specialists at the Azerbaijan State Scientific Research and Design Institute for the Oil Industry (AzNIPIneft') have come up with a new pumping unit for tubeless well production. Employment of this new unit makes it possible to eliminate the pumping-compressor tubing used in the bottom-hole method of crude oil production, prevents deformation of the casing string, reduces well downtime for repairs, and increases well time



between repairs [Text] [Baku VYSHKA in Russian 14 Nov 82 p 4] 3024

ORDZHONIKIDZE OIL PRODUCTION--In the competition to honor in a worthy manner the jubilee of the Soviet State, considerable success among the subdivisions of the Ordzhonikidzeneft' Oil and Gas Production Administration has been achieved by the workforce of Field No 1, headed by experienced specialist Aziz Shamailov. In the first 10 months of this year they have produced 183 tons of crude oil and 442,000 cubic meters of natural gas on the basis of adopted pledges. These results are due to good engineering work on the well inventory and the ability to utilize advanced equipment in an efficient manner. The workers of this field also devote considerable attention to bringing wells back into production following a lengthy period of shutdown. Six wells, aggregate additional production from which totaled approximately 200 tons of crude, have been brought back into production since the beginning of the year with the assistance of major overhaul brigades. The downhole well maintenance brigades led by Aliaga Aliyev, Ali Akhmedov, and Abdin Kerimov are working at full efficiency; they were among the first in the shop to follow the example of the Bashkir oilmen and to shift over to the new plan-estimate indices. Engaging in labor rivalry in honor of our country's jubilee, the workforce of this leading oilfield has decided to produce an additional 30 tons of crude oil and 50,000 cubic meters of natural gas above target by year's end. [By VYSHKA volunteer correspondent G. Guseynov] [Text] [Baku VYSHKA in Russian 4 Dec 82 p 3] 3024

ZHETYBAY GAS-LIFT PRODUCTION--Shevchenko (KazTAG)--Production flow has been doubled from the wells in the Vostochnyy Zhetybay oilfield by converting them to gas lift. Implementing the decisions of the 26th CPSU Congress pertaining to adoption of this advanced production technique, the Mangyshlak oilmen have decided to produce half of the liquid fuel obtained from the ground with the aid of gas lift by the end of the five-year plan. Nature has generously endowed the Mangyshlak with gas -- an ideal "transporter" of viscous fluids. Injected into a well, it "unclamps" the crude oil and brings it to the surface. But the pace of adoption of the gas-lift method has diminished lately -- increased well production volumes have required even greater gas "energy." "We drew up a plan for renovating existing systems and the compressor station at the Kazakh Gas Processing Plant," stated B. Mullayev, head of the Kaznipseft' Institute's gas-lift laboratory. "Next year we shall increase working pressure in injection wells from 55 to 80 atmospheres." But not all wellbores require such pressure. Intermittent gas lift will make it possible to increase flow from stripper-type wells. An optimal time has been determined for each such well, during which oil accumulates downhole; they are equipped with automatically opening gas-lift valves. It is expensive, however, to use gas which has already been produced. Therefore oilmen have decided to use gas which is already in the ground in a number of fields where geologic conditions permit. Gas and oil producing zones are connected, and the mixture of the gas and liquid hydrocarbons rises to the surface. The new method has already made it possible to produce more than 20,000 tons of crude in addition to the plan target at the Karamandybas field. Savings generated by the alliance between scientists and producers already total a quarter of a million rubles. [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 21 Nov 82 p 1] 3024

KARA KUM GAS PIPELINE--Urgench (A. Uzilevskiy)--These terms are not very compatible: desert and natural gas pipeline. But the farmer has come to the burning sands of the Kara Kum; with heavy equipment he has pushed back the dunes and has established rice-growing and orchard-vineyard sovkhozes here. New farmsteads are being built. These pioneers include the experienced experts of the Khorezm mobile mechanized column of the Uzbekgazstroy Trust. Natural gas hookups have now been provided to 70 new settlers' homes on the virgin-land Kara Kum Sovkhoz. "Our workforce," stated mobile mechanized column chief U. Safayev, "is honoring the 60th anniversary of the USSR with pledge fulfillment. In the last 9 months gas hookups have been provided to 2400 homes of farm workers in the villages and communities of this oblast, and 15 kilometers of above-target gas service lines have been laid." By year's end gas lines will be run to four more Khorezm kolkhoz and sovkhoz settlements. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 5 Nov 82 p 1] 3024

EARLY GAS PRODUCTION FULFILLMENT--Gas industry workers have met ahead of schedule the year's gas production target. By year's end above-target gas production will exceed 8 billion cubic meters. Production increase over 1981 will amount to 35 billion cubic meters. [Text] [Moscow PRAVDA in Russian 26 Dec 82 p 1] 3024

URENGOY GAS TO KURSK--Urengoy gas has now reached Kursk Oblast. A compressor station capable of moving tens of millions of cubic meters of gas per day has come on-line. It will be operating on the Yelets-Kursk pipeline, a distributing line in the network of trunk pipelines from Urengoy which are in operation and under construction. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 25 Dec 82 p 1] 3024

ABOVE-TARGET TURKMENISTAN GAS--(Turkmeninform)--Leading workers of the Turkmengazprom Production Association will be carrying an unusual banner at the head of their celebration column, bearing only the number 800. The gas field workers of Turkmenistan are presenting a gift of 800 million cubic meters of gas above target in honor of the 65th anniversary of the Great October Revolution. More than half of this figure is to the credit of the workers of Shatlyk. The above-target gas will fill the needs of all customers in the republic, including such large enterprises as the Mary GRES, the Bezmein GRES, and a cement plant, for 100 days of operation. [Text] [Ashkhabad TURKMENSKAYA ISKRA in Russian 7 Nov 82 p 3] 3024

CASPIAN WELL COMES IN--(V. Gol'tsev)--The new Well No 7 has been brought into production by the workforce of the Oil and Gas Production Association imeni 22nd CPSU Congress. It was drilled in the promising Field imeni 28 April from a platform by a drilling crew from the Neftyanyye Kamni Offshore Drilling Administration led by tool pusher G. Aliyev, foremen M. Gadzhimetov and A. Avanesyan, to a depth of 3600 meters, where a discontinuous formation was tapped which is an oil producer in this area. According to preliminary measurements, this well is producing a daily flow of up to 350 tons of clean crude through a 13-millimeter wellhead connection. Well No 7 has reconfirmed the experts' opinion about the high productivity of this reservoir, development of which shows great promise for increasing our oil reserves. Four exploration wells are presently being drilled in this area of the Caspian. Two wells are being drilled down toward the pay sand from Platform No 2, the first to be built

in a water depth of more than 100 meters. Work is also proceeding well on the "Shel'f-1" and "Kaspmorneft'" floating rigs; the crew of the latter has successfully completed drilling Well No 5 to a depth of 3840 meters. The drillers have already set in and cemented the oil string, and the formation is presently being tested. The smoothly operating drilling crew, preparing to honor our country's jubilee in a worthy manner, is working even more efficiently these days, skillfully utilizing all available reserve potential. [Text] [Baku VYSHKA in Russian 18 Nov 82 p 1] 3024

BASHKIR OIL PROSPECTING SUCCESS--Ufa (Yu. Kalinnikov)--For 3 years now the workforce of the Bashneftegeofizika Trust has retained the challenge Red Banner of the CPSU Central Committee, USSR Council of Ministers, All-Union Central Trade Union Council, and Komsomol Central Committee. It was also nominated by the board of the Ministry of Petroleum Industry for this high honor this year, based on the results of the All-Union Socialist Competition in honor of the 60th anniversary of establishment of the USSR. More than 1500 leading workers -- one out of every two production workers -- reported fulfillment of the annual plan target and targets for the first two years of the five-year plan. And they are tough targets. In such old, developed oilfield areas as Bashkiria, the fields have long since been discovered and have long been in production; naturally these fields' resources become exhausted in time. In order to maintain a high production rate, geophysicists are looking for deeper and more complex-structure reservoirs. Thanks to advances in seismic prospecting techniques and equipment, today geophysicists can determine from the surface not only the subsurface structure but also the physical properties of sedimentary beds. Just in recent years dozens of new fields have been discovered here. And the oilfield geophysicists are determining the optimal drilling and production techniques. Twenty oilfield and four seismic prospecting parties have completed the schedule of operations specified for 60 shock-work weeks in honor of the anniversary of the USSR. They have greatly assisted the oilmen of Western Siberia. Right-flankers of the five-year plan include field party chiefs L. Gavrilov and R. Yakupov, drillers M. Batyrov and R. Shakhautdinov, and crane operator B. Vasimirskiy. The workforce of this Red-Banner Trust has boosted labor productivity by 5.2 percent. They have above-target produced 300 kilometers of seismic profile and completed the preliminaries for deep exploration drilling. [Text] [Moscow IZVESTIYA in Russian 9 Dec 82 p 2] 3024

TASHKENT NATURAL GAS--Tashkent, 19 Nov (PRAVDA correspondent N. Gladkov)--Natural gas has reached another rayon seat in Tashkent Oblast, this time the youngest one -- Parkent. The more than 25-kilometer gas pipeline was constructed in the difficult conditions of mountainous terrain by the people of the Uzbekgazifikatsiya Trust. The crews of S. Chekmenev and E. Zagorskiy were able to complete construction 3 months ahead of schedule. Next year a gas pipeline is scheduled to be run to the rayon seat of Buka. [Text] [Moscow PRAVDA in Russian 20 Nov 82 p 6] 3024

DAULETABAD GAS FIELD--Ashkhabad, 1 Jan (TASS)--The Dauletabad gas field, with an annual production capacity of 5 billion cubic meters, situated in the southern part of Turkmenistan, is now contributing gas to the Central Asia-Center trunk natural gas pipeline. A large gas processing plant has been built in the desert, pipelines have been laid, and more than 10 deep wells have been drilled. Production startup in the Dauletabad field signals the beginning of exploitation of a new gas-producing area in the Kara Kum. [Text] [Moscow PRAVDA in Russian 2 Jan 83 p 1] 3024

GAS TO BREST OBLAST--(BELTA)--Natural gas has come to the village of Malyye Korchitsy in Kobrinskiy Rayon. Gas-burning kitchen ranges have been installed in homes, and a boiler house which heats production and cultural-services buildings has been converted over to this cheap fuel. The comprehensive plan for bringing gas to Brest Oblast is being successfully carried out. A second string has been laid on the Kobrin-Brest pipeline, connected to the Siyaniye Severa [Northern Lights] trunk pipeline system, the Brest and Pinsk terminal line stations have been renovated, and the gas facilities production base has been expanded. Almost 85 percent of rural dwellings now have gas service. [Text] [Minsk SEL'SKAYA GAZETA in Russian 18 Nov 82 p 2] 3024

PERM OBLAST CRUDE--PERM--A strong flow of crude has been obtained from a well drilled in the Pikhtovoye field in Perm Oblast. "Well flow -- 170 tons -- is greater than what we expected," stated Yu. Dulepov, chief geologist of the Permneft' Association. "The association's best drilling crews have now been transferred to the Pikhtovoye area, work has started on drilling several production wells, and a new settlement for oilfield workers is being built. This year the new field will be hooked up to a trunk pipeline." [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 15 Nov 82 p 1] 3024

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## COAL

### PLAN FOR LEGAL SUPPORT TO IMPROVE COAL INDUSTRY RESULTS EXPLAINED

Moscow KHOZYAYSTVO I PRAVO in Russian No 7, Jul 82 pp 32-35

[Article by Yu. Tsimerman, chief of the Juridical and Arbitration Department of USSR Minugleprom [Ministry of Coal Industry], doctor of juridical sciences, and RSFSR Distinguished Jurist: "Skillful Use of Legal Levers"]

[Text] USSR Minugleprom [Ministry of Coal Industry] has confirmed and is implementing an integrated plan of measures for legal support of the fulfillment of 11th Five-Year Plan tasks.

Fulfillment of the tasks set by the 26th CPSU Congress requires purposeful work by each economic organ and precise definition of the problems that it is to solve during the current five-year plan.

There can be no doubt that the work of any subdivision that limits itself just to the task of the day, that does not focus on the long term or consider the trends in development of the industry, association or enterprise, will not be very effective.

These premises were fundamental when, during a review by the Board of the USSR Ministry of Coal Industry and the presidium of the industry's trade-union central committee in April 1981, the Juridical and Arbitration Department presented proposals for improving legal work during the 11th Five-Year Plan.

Preceding this was an analysis of activity to strengthen socialist legality, to use legal means to fulfill the plan for the industry's economic and social development, and to insure the observance of labor legislation. The bases of the analyses were the results of a 1980 inspection of legal work in associations, combines, enterprises and organizations that indicated not only growing activeness of the juridical services and their potential but also inadequacies that existed in organizing legal work.

A number of businesslike proposals for improving legal work in the industry were introduced also at a branch conference of juridical-services supervisors of 55 production associations that convened at Pervomaysk, Voroshilovgradskaya Oblast.

When the results of a check on the status of legal work in the field and reports on the status of legal work in economic organizations are added here, it becomes clear that the Juridical Department had at its disposal exhaustive factual information for a scrupulous analysis of the status of the industry's legal work.

An integrated plan of measures for legal support in carrying out 11th Five-Year Plan tasks, which was developed on the basis of an analysis of all this information, was approved by an expanded board and was confirmed by a ministry order. The plan contains two chapters. The first calls for measures to insure the observance of labor legislation, while the second relates to the improvement of contractual and complaint-investigation operations. The deadlines and the ministry subunits, associations and enterprises that are responsible for executing the measures are pointed out for each measure.

Measures for insuring the observance of labor legislation are grouped under four subheadings.

The first subheading calls for, along with actions that should be performed continuously by juridical departments to prevent labor legislation violations, an analysis to be made semiannually of the causes of labor legislation violations that have been committed, measures to be developed for eliminating them, and advanced experience in organizing the work to prevent violations to be studied and disseminated.

It also was stated here that juridical departments should conduct seminars during the year in accordance with an approved plan, particularly with workers of personnel departments, on study of the bases of labor legislation.

This chapter also expresses a measure that has proved itself well before--each worker on the ministry's roster newly named to a supervisory post should first undergo a probationary period in the juridical department. The Administration of Personnel and Training Institutions is adhering strictly to this rule. Workers joining the staff of a production association undergo a probationary period in the association's juridical services. This will enable the attention of future economic managers to be called to the problems of preventing labor legislation violations.

The second subheading, "Insuring the Observance of Labor Legislation," requires the ministry and trade-union central committee, as well as the associations and their trade-union committees, to make integrated inspections semiannually on the observance of labor legislation in the industry's primary elements and production units, and the subunits responsible for this are defined. Thus, work-safety administrations and services and the trade-union technical inspectorate are responsible for organizing and making checks in the area of labor safety; administrations (or departments) for setting work norms and pay and the trade union's legal and technical inspectorate are responsible for observance of legislation about workers' work time and rest time; worker-personnel administrations (or departments) are responsible for utilization of the labor of women and youths and for observance of the procedure for keeping up work records; and the juridical services are responsible for other questions of labor legislation (hiring, transfer, discharge, calling personnel to account, the combining of jobs, and other questions).

The conduct of checks on labor-legislation observance during integrated inspections has been vested in the monitoring-inspection administrations and the juridical departments of ministries and industrial associations.

Judicial organs examine matters for which the industry's enterprises and organizations bear responsibility. Juridical departments generalize and analyze legal

practices on labor disputes in the first quarter of each year. This enables measures to be worked out for eliminating factors that engender disputes at work.

In 1983 a public inspection of organization of the work to insure the observance of labor legislation in the branch will be conducted.

A broad set of measures is planned also under the subheading, "Legal Propaganda," Here, aside from the traditional studies in the mastery by supervisors, engineers and technicians and white-collar workers of the bases of legal legislation, it is planned to organize monitoring of the activity of public legal-advice services (there are 834 in the industry), using information from inspections and analyses of violations, to disseminate advanced work experience, and to prepare appropriate materials for the industry's informational publications and for local newspapers.

This subheading also calls for the holding of a legal-propaganda month, the execution of legal education work among youth, and the augmentation of funds for legal libraries and for supplying legal-study offices and facilities with handbooks and popular juridical literature.

In the second half of 1982 the ministry's juridical department and the legal inspectorate of the trade-union central committee will conduct an inspection contest for the best organization of legal education work. Associations' juridical departments will analyze legal propaganda effectiveness each year, with a view to averting cases of legal legislation violations.

Under the last subheading, the use of legal means for strengthening labor discipline and dealing with absenteeism, for eliminating worktime losses during production, for checking on the legality of involving blue- and white-collar workers in work not connected with labor activity and the retention of wages in such cases, is vested in the juridical departments. Trade-union committees are required to conduct seminars twice each year with comrades' court chairmen, simultaneously discussing tasks on raising their role in strengthening work discipline.

The juridical department is to develop instructions about legislation that regulates questions of enlisting workers for the performance of social and state responsibilities, and the use thereof will help to eliminate violations.

Other measures also are planned that are aimed at insuring the observance of labor legislation within the industry.

A program for improving the organization of contract and complaints work includes nine subheadings. The basis for it is precise definition in the statutes of the enterprise subdivisions and, in the official rules, of the tasks, functions and responsibility of the various services and workers for the proper execution of economic agreements and the formulation of reporting documentation that relates to contract and complaints work. This work is, on the whole, already being performed.

The first subdivision requires that seminars and workshops be held at least twice annually with juridical consultants and other officials who are engaged in contract and complaints work, that inspections and mutual inspections be made at enterprises and organizations, and that the use of computing centers for monitoring the timely implementation of agreements be expanded.

The other headings note measures for improving economic ties for the delivery of output, capital construction, mutual relations with the railroads, work associated with assuring the safekeeping of output and the reduction of nonproductive expenditures, and complaints investigation work, including the acceptance of products with regard to quantity and quality.

It is recommended that production associations examine drafts of agreements and statements of discrepancies ahead of time--at sessions of arbitration commissions within production facilities, with the participation of those directly involved--the representatives of underground and strip mines and preparation plants (the production units).

The industry's associations include not only production units but also self-contained enterprises. In this connection, it is planned that agreements will be concluded between them and the association about mutual property liability, as a basis for the realization of cost-accounting relationships. In considering the importance of the work to assure the safekeeping of products and to fight against shortfalls, production associations, combines and enterprises should regularly conduct monitoring weighings of unloaded coal, with the participation of representatives of the purchaser, and should organize trips by underground- and strip-mine and preparation-plant workers for a joint check on observance of the procedure for accepting incoming output and on establishment of the causes of shortfalls.

The timber received by production associations often is unloaded at different storages, and shortfalls are frequently observed. Therefore, associations are charged with responsibility for organizing coordination of the acceptance of railroad cars with timbers that are unloaded for a single account but which are received at different storages.

One of the reserves for saving association and enterprise funds is the elimination of nonproductive expenditures connected with paying forfeitures and penalties. Therefore, it is recommended that the industry's economic organs not only hold commission meetings regularly to examine and prevent nonproductive expenditures but also call to pecuniary account more widely those officials guilty of causing losses.

The subheading, "Generalization of Experience in Contract and Claims Work," contains, in particular, an expression of the question of coordinating the activity of production associations and enterprises with the VPO's [All-Union production associations].

By 1984, the preparation of recommendations on a methodology for supervising legal work in the industry is to be completed, in accordance with data on generalization of the results of the work.

Since the second half of 1981 the juridical department, as specified in the measures, has been introducing into association work practice methodological recommendations about the participation of the juridical services in the work on concluding and executing contracts for the hauling of freight by rail transport and the assurance of its safekeeping that were developed by the USSR Ministry of Justice.

These are measures whose realization should promote legal support in carrying out the tasks that face the industry during the 11th Five-Year Plan.



In our view, these measures' virtues lie in the fact that the industry's juridical services--from the enterprises to the ministries--act in harmony, their work is coordinated with precision, and other subunits are linked up with this work. Publication of the indicated document is being called upon to prevent multiple issuance of documents in regard to various areas of the work. This, aside from being simpler, has also created a real possibility for monitoring execution of the measures contemplated.

Based upon the ministry's order, the industry's associations and combines have worked out and approved measures for raising the level of legal work and strengthening legality in all spheres of economic activity.

How is the integrated plan for legal support of the branch's activity realized in real life? The example of one of the largest coal-industry regions--the Kuznetsk Coal Basin (Kemerovskaya Oblast), at whose enterprises and organizations a large detachment of jurists--about 250--are working, has demonstrated this graphically.

First of all, integrated plans for legal support, in accordance with which standardizing documents for improving the organization of economic and legal relationships are developed, have been approved in all production associations and their production subunits--the underground mines and strip mines. Their realization in 1981 and the first quarter of 1982 showed a growing activeness of juridical and other services in the use of legal resources for improving operations. This enabled effective action against unscrupulous contractors, from whom 25 million rubles were exacted in 1981, much more than in the preceding year; improvement in the fulfillment of plans for shipping coal in accordance with contracts that have been concluded; and the solution of problems about the supplying of materials and equipment and about transport support for the mines.

An intensification of monitoring and analyses of the fulfillment of plans for shipping coal by grade and type enabled contract commitments to customers to be carried out in the first quarter of 1982 by all Kuzbass [Kuznetsk Coal Basin] associations.

Prior to 1981 the contract made by Yuzhkuzbassugol' [South Kuznetsk Coal Basin Production Association] with the railroad administration called for cars to be delivered to the spur tracks as they became ready, in equal lots in the first and second halves of the day. The railroad was granted the right to increase car deliveries by 20 percent in the second half of the day in case of a shortfall thereof during the first half. There were cases when the daily quota of cars was delivered in a short time, and the cars, naturally, could not be loaded up in the allotted time.

The new contract required that cars be delivered to the associations in accordance with a precise schedule within the day.

In 1981-1982 many underground and strip mines improved the acceptance of output in quantity and quality. Thus the Pionerka and Zapadnaya Underground Mines of Leninskugol' [Leninsk Coal Production Association] and Yuzhkuzbassugol' imeni Shevyakov created special commissions for the acceptance of equipment, materials and other products. The commissions included mechanics and bookkeepers. Rules and instructions about the commissions were worked out, and an accounting for the operation of equipment within the guarantee period was made. The commissions are working in close contact with juridical consultants. Doing so enables timely, good-quality formulation of the acceptance reports and other documents of a legal nature.

The introduction of a set of means for averting violations of labor legislation, the use of various types of legal propaganda, and the realization of other measures called for in plans for the legal support of the associations' activity have helped greatly to strengthen socialist legality in the branch.

Actual implementation of the measures planned undoubtedly will help in successful realization of the complicated tasks that face the industry during the 11th Five-Year Plan.

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## COAL

### PROGRESS IN BUILDING UP EKIBASTUZ COAL FIELD FACILITIES REPORTED

Moscow STROITEL'NAYA GAZETA in Russian 10 Nov 82 p 2

[Article: "Tomorrow's Mining Front"]

[Text] This was the headline of the article published in SG [STROITEL'NAYA GAZETA] on 7 July of this year. It spoke about deficiencies in forming the Ekibastuz Fuel and Power Complex.

As the editorial board reported, Deputy USSR Minister of Coal Industry A. Pshenichnyy and the ministry have developed and are implementing organizational and technical measures for developing the Ekibastuz Coal Basin.

As a result of the work that has been done, coal mining in the Ekibastuz basin grew 1.6-fold during the 10th Five-Year Plan. Construction of the Bogatyr' Strip Mine, with a capacity of 50 million tons, was completed by the established deadlines. Work has started on construction of the Vostochnyy Strip Mine, of 30 million tons capacity, and so has rebuilding of the Severnyy Strip Mine, whose capacity will be brought up to 35 million tons.

In order to improve domestic conditions for Ekibastuz miners and construction workers, 187,000 square meters of housing, a shopping center to serve 12,000 residents, stores with total trading area of 1,000 square meters, kindergartens for 1,020 children and a number of other facilities for cultural and domestic-amenity purposes were introduced.

The construction industry base has been strengthened. Capacity for producing welded structure and commercial fittings and fixtures and a casting yard for making reinforced-concrete structure have been introduced. Obsolete equipment on plant manufacturing lines has been replaced.

In order to maintain existing capacity and to prepare new horizons at the Bogatyr' and Severnyy Strip Mines, a strip-mine construction administration has also been established. Ministry organizations in Ekibastuz have been allocated highly productive mine-stripping and construction machinery.

However, short construction time has not permitted the ministry to carry out plan tasks completely. The construction of facilities for an in-house production base and housing has lagged.

The CPSU Central Committee and USSR Council of Ministers decree about additional measures for accelerating coal strip mining in the Ekibastuz basin in 1981-1990 planned to introduce new capacity for mining 15 million tons of coal at the Vostochnyy Strip Mine. The necessary capital investment and highly productive mine-transport machinery have been allocated for fulfillment of assigned tasks for introducing new and maintaining existing capacity at Ekibastuz strip mines.

In order to strengthen the construction-industry base, it is planned to complete the rebuilding of plants that make large-panel housing construction and welded structure, the base for supplying materials and equipment, and the motor pool, to introduce new capacity for producing ready-mix concrete and mortar and for wood processing, and to build 350,000 square meters of housing, four kindergarten-nurseries and two schools. Construction manpower at Ekibastuz will be brought up to 10,000.

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## COAL

### ELECTRIC-MOTOR BREAKDOWNS IDLE HUGE EXCAVATORS AT ANGREN

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Nov 82 p 2

[Article by excavator operators V. Lazarev, A. Makhkamov and Yu. Ivantsov and assistant excavator operator V. Mirzayev of the Angrenskiy Strip Mine (Angren, Uzbek SSR): "Where Do You Buy an Electric Motor?"]

[Text] Since the start of the year excavator brigades of the Angrenskiy Strip Mine of Sredazugol' [Central Asia Coal Production Association] have sent customers 100,000 tons of coal above the plan. It goes without saying that this figure is high, but we achieved it with great strain. There is one explanation: because of poor spare-parts supply, mining machines, including mighty excavators, were forced to be idle.

The main thing is that the supplying plants categorically refuse to ship spare parts for the excavators, to replace those that have become inoperative during the guarantee period through their own fault. Here are several cases: in half a year after introduction into operation, an EKG-8 excavator of the Izhorskiy Plant, factory No 1178, gave out. The guarantee still had not run out, but the DE-816 electric motor, which was made by Moscow's Dinamo Plant, had already failed.

An EKG-4u excavator (No 240) from the same plant worked barely more than 2 months, again because of the breakdown of the DPE-52 electric motor, which was made by Moscow's electrical machinery building plant Pamyati revolyutsii 1905 goda. All the machines that are awaiting spare electric motors or the repair of motors that have gone out of commission have been idle for a long time. A significant amount of coal has been lost.

Then a commission was created, to which representatives of the plants were summoned. Together with them we investigated the causes of the breakdowns. There was one conclusion: they were the fault of the manufacturing plant, and no one else. We said to them: send electric motors at once. However, the Izhorskiy plant answered with a refusal, justifying it by the fact that the motors are strictly limited, and it was not possible to supply them above the amounts that had been allocated. But what are we to do here in this situation?

The strip mine appealed with a claim to Gosarbitrazh [State Arbitration Commission], which is under the USSR Council of Ministers. That body exacted from the plant a penalty for shipping products with a defect and required it to send us new electric motors within 2 months. The 2 months have passed, but the Gosarbitrazh decision has not been carried out, because the cost of these motors had been exacted

from the plant. And that's all there is to it. What else can we do? We have the money, but who can buy electric motors now for an entirely new excavator? We agreed to pay for them 5-fold, but where can you get them? It's a problem!

And now we have been compelled to use in these brand new machines, fresh from the factory, old electric motors that somehow have been repaired, motors which, time after time, break down, creating interruptions in the work.

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COAL

# KRASNOYARSK EXCAVATOR PLANT UNDER CONSTRUCTION BUT STARTS WORK

Moscow PRAVDA in Russian 1 Nov 82 p 1

[Article by V. Prokushev (Krasnoyarsk): "En Route, an Excavator!"]

[Text] The diesel locomotive gives a long toot and, to the applause of the assembled workers, two rail flatcars roll out to the plant's yard. On them are more than 70 tons of components and parts for future mining machines--the first output of Krastyazhmash [Krasnoyarsk Heavy Machinebuilding Production Association], which was formed recently on the basis of the Krasnoyarsk Heavy Excavator Plant.

As PRAVDA has already reported, the flatcars will go to the Irsha-Borodinskiy Strip Mine--one of the locations of KATEK [Kansk-Achinsk Fuel and Power Complex]. Following them, at least 80 more cars of parts should arrive there, from which two EKG-12.5 excavators should be assembled ahead of schedule, by the 60th anniversary of the forming of the USSR. Such are the socialist commitments of the young enterprise's machinebuilders. They are still working just in small temporary areas, but they have begun to produce output with the active assistance of Sibtyazhmash [Siberian Heavy Machinebuilding Production Association]. Yet next year they are to assimilate large production capacity and manufacture four excavators with their own forces.

"Today our collective is registering its first and important, though small, labor victory," comments association General Director B. Yegorov. "Four years of strenuous work by construction workers, workers of our plant and other plants, and designers and design developers preceded this day.

"Sibtyazhmash transferred to the young enterprise experienced engineers, technicians and workers. Staff workers of the local scientific-research and design-development industrial institute of Sibtyazhmash did a substantial portion of the development work. Many enterprises, including the local Sibtsvetmetavtomatika [Siberian Association for the Automation of Nonferrous Metallurgy Enterprises], the Moscow area's Elektrostal' and others voluntarily did certain work in carrying out the orders of the excavator operators."

So far, one building has a roof over it--a block of departments for nonstandardized equipment. Incidentally, this firstling cedes nothing to any plant--thousands of people work here. The collective chose basically young people, but many are already acquainted with the specifics of the work. Manufacturing engineers and workers are studying courses at the Novokramatorsk and Izhorsk plants and at Sibtyazhmash.

Competition under the Workers' Relay principle is being arranged. In the metal-structure department we became acquainted with V. Krasnov's brigade of assembly mechanics. Vladimir himself is a native Siberian. He went through the BAM [Baykal-Amur Mainline] school, and now he has returned to his home kray, to KATEK. Here he has been accepted for membership in the CPSU and has been entrusted with supervision of a brigade. The assemblers' work is going well. Andrey Shcherbakov, Nina Tornakina, Vladimir Kosov, Viktor Lyubetskiy, Vladimir Danilov and other brigade members have each mastered two or three related trades.

The plant's workers are confident of coping successfully with their commitments: the first two Krasnoyarsk excavators will be manufactured by the end of December. But a strenuous program for next year lies ahead--and then in 1984 there is the startup of the plant's first line and conversion to the production of the rotary giants. Meanwhile, Ekskavatoryazhstroy [Association for the Construction of Heavy-Excavator Manufacturing Enterprises] builders recently slowed the pace of their work. The erection of buildings for auxiliary and machinery assembly departments and for the production of mining machinery and other facilities is lagging greatly behind schedule.

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## COAL

### BRIEFS

KARAGANDA STRIP MINE REPORT--Saving labor honor in one's youth has become the rule in the Borlinskiy Strip Mine collective. The youngest enterprise in Karagandaugol' [Karaganda Coal Production Association], in upholding it, has loaded up its millionth ton of coal above plan since the start of the five-year plan, electric-power stations of the Moscow area and Kazakhstan having received half of this increment this year. "The strip mine that was created only 2 years ago," comments association General Director N. Drizhd on this labor success, "has already surpassed the largest underground mines of our basin in productive capacity. The precision in interactions of associated subunits, which have outstripped the critical-path schedule for coal mining, has been telling." Answering the CPSU Central Committee's pre-October appeal with deeds, the Borlinskiers are confident that they will give the national economy 200,000 tons of coal above the plan by the end of the year. [KazTAG [Kazakh Telegraph Agency]] [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 26 Oct 82 p.1] 11409

KHAKASIA MINERS EXCEL--Abakan, 29 Dec 82--Izykhskiy Coal Strip Mine excavator operators have sent out the concluding trainload of fuel on their account for the annual plan. This is the third coal enterprise of Khakasia to overfulfill its commitments during the anniversary drive. We reported first at the start of December about miners of the Yeniseyskaya Underground Mine fulfilling their plan, and then during the anniversary week the Khaskasskaya mine collective saluted the anniversary. Thanks to the skill of the equipment operators at these three enterprises, tens of thousands of tons of fuel above the annual task have been mined. [Stringer S. Yezhov] [Text] [Moscow PRAVDA in Russian 30 Dec 82 p 1] 11409

VORKUTA MINERS EXCEED PLAN--Vorkuta, 13 Nov--It is not just for one day that the red star on the headworks of the Vorgashorskaya Underground Mine has been lit--a symbol that the miners are coping successfully with fulfillment of the daily plan for mining coal. The collective has met the plan for the first 2 years of the five-year plan ahead of time. Since the start of this year alone, miners of the Pechora Coal Basin's leading underground mine have recorded more than 300,000 tons of coking coal on their above-plan account. [Stringer O. Vil'chevskiy] [Text] [Moscow PRAVDA in Russian 14 Nov 82 p 6] 11409

LVOV MINE-SUPPORT ACTIVITIES--Sosnovka, Lvovskaya Oblast--Our underground mine has a contract for electric-power supply from Lvovenergo [Lvov Regional Power Administration]. Everything would be nice, but Ukrzapadugol' [West Ukrainian Coal Production Administration] in April allocated the ceiling only for production needs associated with the mining of coal (the mine has stayed within it). In so doing, however, the fact that neither the kindergarten nor the Shakhter Health Center use

stearic candles had been "forgotten." A penalty was exacted five-fold from the mine for these institutions' use of electricity, as if a ceiling had been breeched. It was explained during a check that the "facilities" named had not been granted ceilings--annual, quarterly or monthly--for consumption of electricity. Ukrzapad-ugol' had not allocated them to the mine, and neither (in its turn) had UkSSR Min-ugleprom [Ministry of Coal Industry]. We ask that the weekly, with the help of Gosarbitrazh [State Arbitration Commission], give us an explanation: is such punishment justified, and where do we go from here? [V. Dubas', Chairman of People's Control Group of Velikomostovskaya Underground Mine No 5] [Text] [Moscow EKONOMICHE-SKAYA in Russian No 47, Nov 82 p 23] 11409

RURAL COAL-DUST WASTED--Korotoyak, Voronezhskaya Oblast--I once wrote in the newspaper, under the standing headline "Novosti," that when railroad coal cars travel 2,000 kilometers, the wind blows away about 1½ tons of coal. This, of course, is a lot, and undoubtedly these losses must be countered. Unfortunately, no one has estimated how much coal spills to the ground when it arrives locally. I will explain. Rail cars unload fuel--good and bad--pell mell at the Raytop base in our Ostorozhskiy Rayon, Voronezhskaya Oblast. The custodian of the so-called fuel book has been shipped--whether he likes it or not--2 tons of coal of average quality and 1 ton of coal dust. The rayon's residents take it home, screen the mass and obtain 1½ tons of good fuel and 1½ tons of dust. About half of it is left, the remainder going to the dump, into gullies and gulches. Why is it discarded? Because the furnaces and boilers in private homes are in no condition to burn the dust. One can try to stoke with sand with equal success. In our Korotoyak village alone there are 3,500 homesteads. Then calculate what losses the state bears: more than 40 cars of 60 tons each make up a whole train. And how many such villages are there in the country whose residents buy coal? I think it would be more businesslike not to push the coal dust onto the purchaser but to send it to the nearest regional boilerhouse or TETs. A forced-air draft is used there, and bulk coal is specially crushed into dust for better combustion. There is also another side to this matter. Disregard the fact that it does not burn--the problem is subtle. It is much more complicated for the residents of settlements to build up the fuel reserve that is necessary for a year. It has to be hunted, and at times the "assistance" of light-fingered folk who have access to fuel is resorted to. And so society suffers not only material but also moral harm. [N. Trofimov] [Text] [Moscow SOVETSKAYA ROSSIYA in Russian 28 Nov 82 p 3] 11409

VORKUTA COAL MINE REPORT--Vorkuta, Komi ASSR, 15 Dec--The miners of mining section No 3 of the Vorgashorskaya Underground Mine, where the chief is mining engineer O. Bobrov, has mined 1 million tons of coal since the start of the year. This is the third year in a row that the collective, which numbers little more than 100 men, has achieved such a result. People of 15 nationalities toil hand in hand here. The yield of a million tons of coal from a section of one longwall coincided with still another remarkable event at the mine. Its collective has completed fulfillment of the plan for the second year of the five-year plan, having mined 4,826,000 tons of coal. Before the end of the year the country will receive 300,000 more tons of fuel from Vorgashorskaya's miners. [Stringer O. Vil'chevskiy] [Text] [Moscow PRAVDA in Russian 16 Dec 82 p 2] 11409

PAVLODAR VOLATILE-COAL STORAGE--Pavlodar--During the fall-and-winter period we store up to 180,000-200,000 tons of coal at Pavlodarskaya TETs-1 (this is a 40-day reserve, established by order of Minenergo). Grade SS Ekibastuz coal (strongly sulfurous) lends itself easily to spontaneous combustion, so it is stored and is packed down daily by rolling with 10 T-100 type tractors. However it is rolled, in

5-6 months the coal will start to burn. It already has a high ash content, but here the ash content is raised still more. Moreover, in 6 or 7 months of storage the coal is weathered by the strong steppe winds. The question is put: is it necessary to establish such a coal reserve here, only 130 kilometers from the Ekibastuz Coal Basin? And this at a time when coal is so necessary in other parts of the country. [Engineer P. Gorbunov] [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 42, Oct 82 p 19] 11409

FAR EAST STRIP MINING--Vladivostok--Excavators were working in an enormous 70-meter deep trench--the new Pavlovka-2 Strip Coal Mine has gone into operation. The new strip mine will give the Far Eastern Economic Region 2 million tons of fuel annually. Having adopted the policy of supplying the kray's enterprises completely with local coal, the Maritime District's miners are increasing their mining volume each year. Thanks to the introduction of new capacity and more effective use of old enterprises, output will grow by 5 million tons over 1981 by the end of the five-year plan. [A. Pushchkar'] [Text] [Moscow IZVESTIYA in Russian 29 Oct 82 p 1] 11409

KIRGHIZ MINERS SAVE TIMBERS--Frunze--The other day miners of the Kyzyl-Kiya Underground Mine Administration sent out the last thousand tons of coal on the account of the socialist commitments adopted in honor of the 60th anniversary of the forming of the USSR. It had mined 40,000 tons of fuel above the annual goal. In increasing the mining of fuel, the administration simultaneously is concerned about reducing the coal's prime production costs. A detailed plan for the strictest savings in both great and small has been developed. The initiator of this movement was Yu. Arbuzov's brigade of section No 1. This collective resolved to save 18,000 rubles' worth of timbering materials. At worked-out zones the miners have been carefully removing posts and overhead timbers. The timber is completely suitable for repeat use at development faces. Other brigades have supported the initiators. And here is the total result: since the start of the year the miners have made repeat use of 1,760 cubic meters of timber supports, 4,320 sets of metal supports worth 173,000 rubles, and many chutes and conveyor chains. Savings amounted to 415,000 rubles, through which the fuel's prime operating cost has been reduced. [P. Laptev] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Dec 82 p 1] 11409

COAL MINED UNDER DONETSK--Donetsk--The miners of the Underground Mine imeni Gorkiy of Donetskgol' [Donets Coal Production Association] were the first in the Donbass [Donets Coal Basin] to carry out the annual plan for coal mining. They sent to the surface and shipped 660,000 tons of high-quality coking coal for Zaporozhye's metallurgists. This is not so much, quantitatively. Other brigades have mined twice as much. But the miners' victory is extremely substantial. They worked seams under a housing tract in the center of Donetsk. Moreover, the seams were very fine. A special knack and skill at intricate work were needed to get the coal without disturbing the city's residents. The miners are removing the seam with UST-2M overhead scraper installations or 1K-101 cutter loaders, and the excavated space here is being gobbled by Titan complexes and ZU's [gobbing installations] of their own design. During this anniversary year the miners' labor productivity has increased sharply, and the prime operating cost per ton of coal has been greatly reduced. The moral factor has worked for success. A strengthening of labor and operating discipline has been undertaken in earnest at the underground mine. An atmosphere of creative initiative and comradely mutual support has been created in the sections. The result has made itself felt rapidly: 140,000 tons of coal and 1,725 meters of mine tunneling above the plan. And not one lagging brigade. [S. Tishchenko] [Text] [Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 11 Nov 82 p 1] 11409

KANSK-ACHINSK MINING RESULTS--Krasnoyarsk--The Kansk-Achinsk Fuel and Power Complex--a future giant of domestic heat and power engineering--is simultaneously being built and operated. Today, all coal-mining enterprises of KATEK [Kansk-Achinsk Fuel and Power Complex] are exceeding the planned schedules. The collective of the industrial-test Berezovskiy Strip Mine completed its annual program a month ahead of time, sending out 1½ million tons of fuel. In recent shockwork weeks, excavation was about 140 percent. Subdivisions of the Borodinskiy Strip Mine have sent customers 19 million tons of fuel--315,000 tons more than planned since the start of the year. In accordance with the commitment in honor of the 60th anniversary of the USSR, the miners will load up 21 million tons of coal by the end of December and will exceed the strip mine's design capacity by a million tons. Operators of rotary excavators and complexes Borodinskiy party gorkom bureau member V. Avtushko, Hero of Socialist Labor B. Aksenov, USSR State Prize Winner P. Cherpakov and other coal-mining experts are setting the tone for the competition. KATEK's miners have decided to give the country 38 million tons of coal during the anniversary year. This greatly exceeds the current total capacity of enterprises of the fuel and power complex that is being formed in the Kansk-Achinsk Coal Basin. [A. Shcherbakov] [Test] [Moscow IZVESTIYA in Russian 19 Dec 82 p 2] 11409

KUZBASS-NOVOSIBIRSK COAL PIPELINE--Belovo, Kemerovskaya Oblast, 17 Nov--Coal will pass through pipes from the Kuzbass (Kuznetsk Coal Basin) to Novosibirsk. For this purpose, the erection of a plant for preparing the coal slurry has started at the Inskaya Underground Coal Mine, close to the city of Belovo. Water under great pressure will rush the crushed fuel over the 300-kilometer pipeline, from the mine to Novosibirsk TETs-5. Such a pipeline is already operating in the Kuzbass. Slurry from the Yubileynaya Underground Mine is being sent to the West Siberian Metallurgical Plant, which is 10 kilometers away. Pipeline transport completely precludes loading and unloading and eliminates coal losses en route. [TASS] [Text] [Moscow PRAVDA in Russian 18 Nov 82 p 1] 11409

MARITIME DISTRICT BROWN COAL--A high-capacity coal strip mine has gone into operation at the Pavlovskiy brown-coal field in the Maritime District. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 44 Oct 82 p 3] 11409

BORLINSKIY SHIPS EXTRA TONNAGE--The collective of the Borolinskiy Strip Mine--the youngest enterprise of Karagandugol' [Karaganda Coal Production Association]--has sent out the millionth ton of above-plan fuel to customers since the start of the five-year plan. [Text] [Moscow EKONOMICHESKAYA GAZETA in Russian No 44 Oct 82 p 3] 11409

KARAGANDA'S SHAKHTINSKAYA MINE--Shakhtinsk--The miners of N. Gladkykh's section of the Shakhtinskaya Underground Mine of Karagandugol' [Karaganda Coal Production Association] have achieved a meaningful success during the labor drive in honor of the 60th anniversary of the forming of the USSR. It mined its millionth ton of fuel since the start of the year, having been the first in the basin to carry out its increased socialist commitments. Labor productivity was 630 tons per worker per month, and average daily mining for the section was 2,894 tons of coal. It was not easy to reach the goal set. The coal has had to be mined under complicated mine-geology conditions that are associated with working a thick seam. The conduct of breakage-face work in all areas of removal enabled full yield to be supported. Mining operations were organized at one longwall instead of the two that had been used earlier. Omitting the step-by-step method helped in the introduction of an improved longwall mining machine with a wide cut of 4.2 meters. The Kazakhstan CP

Central Committee greeted the miners on their remarkable labor victory. First Secretary of the Karagandinskaya Oblast Committee of the Kazakhstan Communist Party A. G. Korkin announced the Kazakhstan CP Central Committee greeting at a meeting that was convened for the remarkable event and he wished the miners new labor achievements. Section chief N. Gladkikh and others gave assurances that in the future they will consolidate the successes achieved and will produce at least 15,000 more tons of coal above the commitment before the end of the year. [KazTAG [Kazakh Telegraph Agency]] [Text] [Alma-Ata KAZAKHSTANSKAYA PRAVDA in Russian 26 Dec 82 p 1] 11409

DOBROPOL MINE REPORTEDLY IMPROVES--An editorial published under this headline ["Coal to the Surface!"] on 22 September pointed out the unsatisfactory work of the Belozerskaya Underground Mine of 'Dobropolyeugol' [Dobropol Coal Production Association], which for 3 years now has not been fulfilling the state plan and is in arrears 160,000 tons of coal for the first 8 months of 1982 alone. The Dobropol City Committee of the party and the Belozerskaya mine's party bureau have reviewed the editorial. The criticism of the enterprise's management, which had paid little attention to the program for developing mining operations and the unconditional fulfillment of the state plan for mining coal, was recognized as correct. The party city committee and the Dobropolyeugol' management, as well as the party organization and the mine administration, adopted urgent measures to overcome the collective's lag. During the fourth quarter, 300 linear meters of mine excavation were driven above the program, and high-speed drifting was organized at two mine faces. Right now the question of strengthening the mine's chief-engineer's service is being resolved. Much is also being done to strengthen labor discipline and to organize active competition among mining and tunneling brigades. The measures taken have enabled breakage-face work to be increased--since September, coal mining at all longwalls has increased remarkably. More than 13,000 tons of fuel above the plan have already been sent to the surface. There is every reason to presume that at least 40,000 tons of additional coal will be mined and the mine will begin to come out from the protracted lag during the months left before the end of the year. Secretary of the Dobropol City Committee of the Ukraine's CP G. Kobzar' reported to the editorial board about this. [Text] [Kiev PRAVDA UKRAINY in Russian 19 Oct 82 p 2] 11409

CSO: 1822/106

## NUCLEAR POWER

### DEVELOPMENT OF CEMA MEMBER-NATION INTEGRATED POWER SYSTEM RECOUNTED

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 11, 1982  
pp 59-63

[Article by Yuriy Savenko, permanent USSR representative to CEMA, and Mikhail Samkov, member of the CEMA Secretariate: "Development of an Integrated Power System for CEMA Member-Nations"]

[Text] The formation and subsequent development of an Integrated Power System (OES) for the CEMA member-nations is a basic direction for improving the international socialist division of labor in the electric-power industry. It makes it possible for the participating sides to realize a number of technical and economic advantages inherent in the parallel operation of an integrated power system. Among these advantages are an increase in the mutual exchange of electric power, a reduction in the total required power reserve within the power systems and an improvement in their operational economy and the reliability of the power supply to the consumer.

The organization of parallel power-system operation among the European CEMA member-nations basically dates back to 1959-1967. The feasibility and efficiency of its implementation was determined by the concentration of power-production sources and the centralization of the electric-power supply. It was likewise determined by an increase in the length and the voltages levels of electric-power transmission lines within the national systems and the desire to utilize more fully the advantages to be derived from a transition from the isolated operation of individual electric-power stations and their groups to joint operation within the framework of the power systems. All of this created the preconditions for the exchange of electric power among the power systems of the CEMA member-nations (at first among their border regions) and for the formation of a network of intersystem transmission lines.

Recommendations for the initial stage of parallel power-system operation among the European CEMA member-nations were prepared by the CEMA Permanent Committee for Cooperation in the Area of Electric Power on the basis of proposals from these countries, approved at the 11th conference of the CEMA Session in May 1959. In accordance with these proposals, the first intersystem 220-kV transmission lines were constructed between East Germany and Poland, East Germany and Czechoslovakia, Poland and Czechoslovakia (two-circuit) and Czechoslovakia and Hungary (single-circuit). Since this time, the power systems of these countries have begun to operate in parallel. In 1962 the Lvov power system of the USSR was connected to these systems. A year later, the power system of Romania was connected. On the

basis of agreements between Bulgaria, Hungary, Romania, Czechoslovakia and the USSR, a 400/220-kV junction substation was constructed in 1963-1965 on the territory of the USSR in Mukachevo. This junction substation was of great significance for the organization of parallel power-system operation among the European CEMA member-nations. In 1965, a 220-kV line from the Dobrotvorskaya GRES in the USSR to Zamost in Poland was put into operation, while a line from Kraynova in Romania to Boychinovtsy in Bulgaria was commissioned in 1967. In this way, the transition to parallel power-system operation among the European CEMA member-nations was practically completed.

With the passing years, the number of intersystem transmission lines in the CEMA member-nation Integrated Power System, their voltages and their capacity have gradually increased. Integrated power systems have become a complex industrial mechanism, characterized by the harmony of the process in time and the uninterrupted connection of their components (generating units, transmission lines, transforming and distributing substations) which encompass a vast expanse of territory. Questions regarding the organization of control over the modes of parallel power-system operation have become more complicated.

In order to more fully utilize the technical and economic advantages of parallel power-system operation and coordinate the corresponding activities of the national dispatch administrations (GDU's), the governments of Bulgaria, Hungary, East Germany, Poland, Romania, Czechoslovakia and the USSR signed the "Agreement on the Organization of a Central Dispatch Administration for Integrated Power Systems" (TsDU OES), to be located in Prague. By June 1982, 20 years had gone by since its creation.

The Central Dispatch Administration [TsDU] is an independent, specialized international organization whose work is governed by a council consisting of representatives of competent agencies from the participating nations. The resolutions of the council are adopted with the approval of the representatives from all interested parties.

The executive organ of this international organization is the Central Dispatch Administration Board. The board began to carry out the functions entrusted to it at the beginning of 1963. Chief among them are:

the development of networks, modes of parallel power-system operation and measures to permit operation with normal frequency;

operational and planning agreement in power-exchange schedules between individual power systems as well as the amounts of reserve power placed at the disposal of the Central Dispatch Administration by the national power systems (with the organization of mutual assistance between the power systems of the participating member-nations of the Central Dispatch Administration on the basis of this reserve and temporarily idle capacities in the national power systems);

the conducting of work with the corresponding national dispatch administrations in order to eliminate emergency operations that interrupt parallel power-grid operation;

operational monitoring of parallel power-system operation and the analysis of this operation in an effort to draft measures for improving its efficiency.

Experts from the Central Dispatch Administration Board are keeping a record of over-currents at intersystem power junctions (making it possible to compare the corresponding measurements). They are also carrying out calculations to determine the participation of the individual power systems in the unplanned exchange of power on a multilateral basis and are performing a number of other functions approved by the participating member-nations of the Central Dispatch Administration to insure parallel power-system operation.

The high efficiency of joint power-system operation among the European CEMA member-nations is confirmed by the results of their practical activity. The basic indicators of integrated power system operation for 1962, 1972 and 1981 are presented in table 1.

Parallel power-system operation among the European CEMA member-nations and the successful solution of the problems associated with the growing utilization of its technical and economic advantages have exerted a great influence upon improving the level of the qualitative and quantitative characteristics of the nations' power systems and the Integrated Power System on the whole.

In the 20 years of existence of the Central Dispatch Administration, the installed capacities of electric power stations within the Integrated Power System and the generation of electric power at these stations have increased almost five-fold. At the same time, there have been substantial changes in the structure of the generating equipment.

In order to more fully utilize the advantages of parallel operation based upon the scientific, technical and economic cooperation of the CEMA member-nations, a number of new electric power stations with unit outputs of 2,000 MW and more were constructed within the Integrated Power System. At the end of 1962, there were only two power units of 200-MW output operating at thermal electric power plants of the Integrated Power System. In 1981, however, there were 275 units of 275-MW capacity and greater.

The structure of installed capacity at electric power stations in the Integrated Power System during the years 1962-1981 was primarily characterized by a considerable decrease in the relative importance of industrial electric power stations (from 30.5 percent to 10.7 percent) and an increase in the contribution of classical thermal electric power stations and general-purpose nuclear power plants (from 60.0 to 78.4 percent) along with an insignificant increase in the relative importance of hydroelectric power stations (from 9.5 to 10.9 percent).

An important condition for a reliable electric power supply within the Integrated Power System is the guarantee of sufficient network capacity, primarily intersystem transmission lines and system-forming networks.

By the end of 1981, there were 22 transmission lines of 220-kV capacity or higher (table 2) and 2 110-kV lines between the power systems of the participating member-nations of the Central Dispatch Administration.

Also in operation at the present time are nine intersystem transmission lines of 110- to 400-kV capacity connecting the Integrated Power System with the power system of Yugoslavia (from the power systems of Bulgaria, Hungary and Romania) as well as 220-kV intersystem lines connecting the Integrated Power System with the power systems of Austria (from Hungary and Czechoslovakia) and Turkey (from Bulgaria).



Table 1. Basic Indicators for Integrated Power System Operation Among CEMA Member-Nations

	Unit of Measurement	<u>1962</u>	<u>1971</u>	<u>1982*</u>
Installed capacity of electric power stations at the end of the year	1,000 MW	28.4	62.3	141.6
Including thermal and general-purpose nuclear power plants	"	17.0	44.9	111.0
Yearly load maximum	"	22.5	48.4	100.6
Total generation of electric power	Billion kWh	137.5	301.9	665.8
Volume of mutual deliveries of electric power	"	...	21.5	47.2
Including deliveries between systems of participating Central Dispatch Administration nations	"	3.4	16.6	32.0

\*Including the Lvov Power System of the USSR in the Integrated Power System until 1977. After 1977, including the integrated power systems in the South.

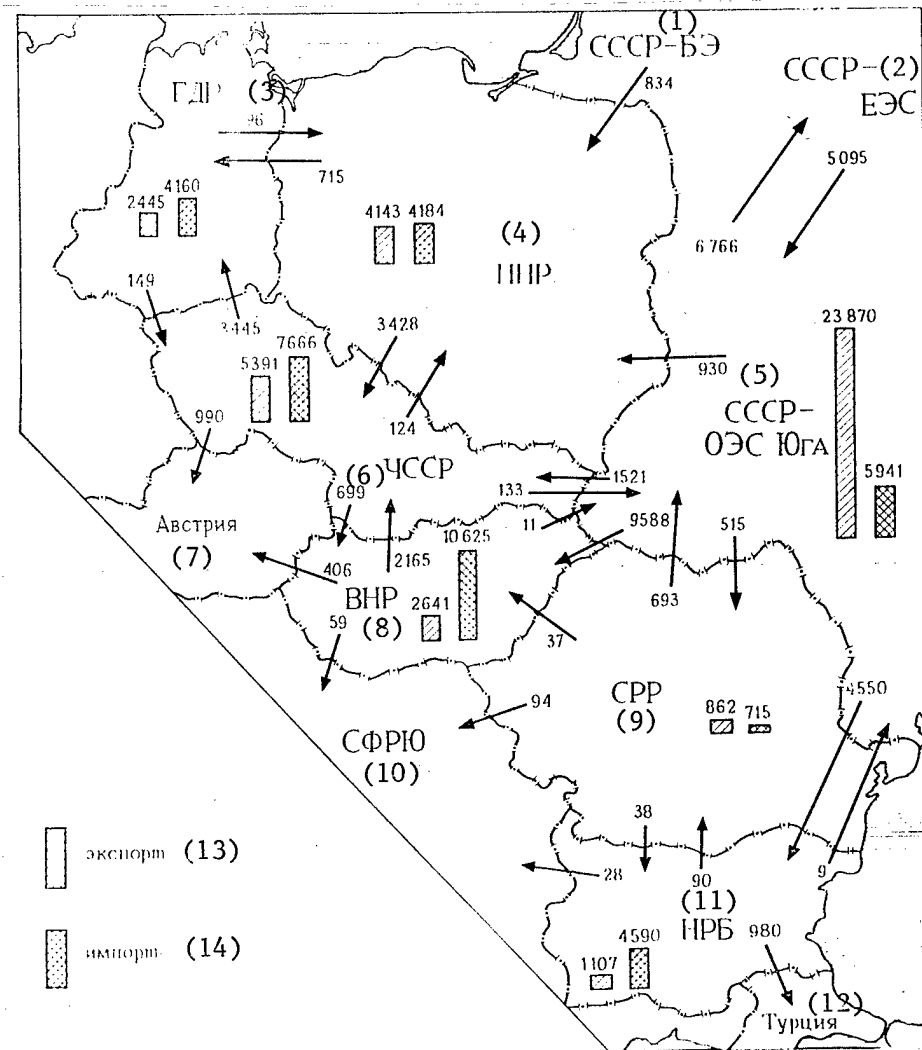
Aside from the strictly planned deliveries of electric power, the capacity of transmission lines must be such that they can provide for the transmission of electric power when emergency-aid situations arise, when the systems break down due to weather conditions, when there are differences in the transmission of daily and yearly power-load maximums, when reserve capacities are utilized, etc. As the experience gained in the operation of the Integrated Power System has shown, these are major factors in establishing the economic impact due to the parallel operation of power systems. In December 1981, for example, the economic impact from combining the electric-power load schedules alone amounted to 2,500 MW.

The intensive development of the Integrated Power System has made it possible to expand the scale of the electric-power exchange between the participating Central Dispatch Administration member-nations as well as with third countries. The volume of mutual deliveries between the first of these rose by 9.5 percent in the years 1962-1981 (see table 1).

The distribution of the export and import of electric power in 1981 is shown in the illustration (figures for the USSR include the exchange of electric power between the power systems of the countries).

The development of parallel power-system operation has to a considerable degree contributed to the solution of a number of basic problems in the CEMA member-nations and agencies. These problems relate to the future development of the electric-power industry and proposals regarding cooperation among the interested countries.

Actual Deliveries of Electric Power Between Neighboring  
Power Systems for the Year 1981 (millions of kWh)



Key:

- |  |                |
|--|----------------|
| 1. USSR-Belorussian Power System         | 8. Hungary     |
| 2. USSR-Unified Power System             | 9. Romania     |
| 3. East Germany                          | 10. Yugoslavia |
| 4. Poland                                | 11. Bulgaria   |
| 5. USSR-Southern Integrated Power System | 12. Turkey     |
| 6. Czechoslovakia                        | 13. Export     |
| 7. Austria                               | 14. Import     |

An important stage in the further intensification of cooperation in this area was the development within the Commission's framework of a General Plan for the further development of the integrated power systems of the CEMA member-nations. Also important is the study of questions regarding cooperation in accordance with the conditions of the Joint Program, including the corresponding cooperation with the power system of Yugoslavia.

The development of the General Plan, approved at the 30th conference of the CEMA Session (July 1976), has made it possible to coordinate in a timely fashion the efforts of the interested nations with respect to the feasible coverage of their power requirements and the guarantee of the necessary power-supply reliability. This was accomplished on the basis of the directions for the development of the industry to the year 1990 as planned by the CEMA member-nations.

In accordance with studies carried out in the development of the General Plan, the utilization of 750-kV intersystem transmission lines was considered optimum under conditions of integrated power system development to the year 1990. The General Plan provides for the construction of a number of such transmission lines. The first of these is the Vinnitsa-Western Ukraine (USSR)-Albertirsha (Hungary) line, commissioned in 1979.

The construction of a network of 750-kV intersystem transmission lines will make it possible to guarantee a high level of reliable power-system operation. It will also create conditions for the more complete utilization of the intersystem effect which, according to estimates, will amount to about 4,600 MW with respect to the 1990 level.

Based on the General Plan, the General Agreement on Cooperation in the Future Development of CEMA Member-Nation Integrated Power Systems for the Period to 1990 was prepared. It was signed in November 1977 by authorized representatives from Bulgaria, Hungary, East Germany, Mongolia, Poland, Romania, Czechoslovakia and the USSR. The chief directions for cooperation within the framework of the General Agreement are:

more complete enlistment of national fuel and power resources in the generation of electric power and heat, the guarantee of their economical utilization, including their utilization through the extensive introduction of centralized heating, the application of up-to-date energy-conservation technology and progressive power-production equipment in different sectors of the economy;

intensive development of the nuclear power industry thanks to the increase in production of equipment for nuclear power plants on the basis of cooperation and specialization;

establishment of an optimum structure for generating equipment within national power-production systems;

construction of the corresponding facilities through the joint efforts of the interested nations;

more efficient utilization of the technical and economic advantages of parallel power-system operation, including the realization of the intersystem effect.

Table 2. Parameters for Intersystem Transmission Lines of 220-kV Capacity and Greater at the End of 1981

<u>Power Systems</u>	<u>Substations</u>	<u>Number of circuits</u>	<u>Working voltage, kV</u>	<u>Thermal capacity at 20°C, MV·A</u>	<u>Year commissioned</u>
Bulgaria-Romania	Kozloduy AES-Krayova	1	220	360	1967
Bulgaria-USSR (OES South)	Dobrudzha-Vulkaneshti	1	400	1,900	1972
Hungary-USSR (OES South)	Albertirsha-Western Ukraine	1	750	-	1979
	Shayoseged-Mukachevo	1	400	1,910	1977
	Tiselek-Mukachevo	1	220	310	1962
	Kishvarda-Mukachevo	1	220	310	1975
	Seged-Arad	1	220	720	1972
Hungary-Romania	Albertirsha-Levitse	1	400	1,440	1978
Hungary-Czechoslovakia	Ged-Bystrichany	1	220	390	1969
	Der-Pod.Biskupitse	1	400	1,440	1978
East Germany-Poland	Hagenverder-Mikulova	2	220	2x310	1960
	Kisdorf-Mikulova	1	400	1,430	1975
East Germany-Czechoslovakia	Zwenits-Gradets	2	220	2x415	1960
Poland-USSR (OES South)	Rehrsdorf-Gradets	2	400	2x1,500	1976
	Zamost-Dobrotvor	1	220	340	1976
Poland-USSR (Belorussian Power System-BE)	Belostok-Ross	1	220	260	1962
Poland-Czechoslovakia	Velepole-Noshovitse	1	400	1,505	1978
	Velepole-Albrekhtitse	1	400	1,505	1978
	Kopanina-Liskovets	1	220	290	1960
	Buyakov-Liskovets	1	220	290	1976
Romania-USSR (OES South)	Roshior-Mukachevo	1	400	1,400	1977
Czechoslovakia-USSR (OES South)	Verkhniye Kapushany-Mukachevo	1	400	1,400	1964

A most important direction for multilateral cooperation among the CEMA member-nations is scientific and technical research and design studies. To a considerable degree they are directed at improving parallel power-system operation and the utilization of power-generating facilities and the improvement of power-network and power-system reliability. An example of the fruitfulness of research cooperation in this area is the development within the Commission's framework (in collaboration with the Central Dispatch Administration Board) of proposals and a design for the technical and programmatic equipping of an Automated Dispatch Control System (ASDU) for the Central Dispatch Administration in Prague. In order to implement these proposals, it was necessary to establish mutual coordination of ideas for the development of ASDU's for the power systems of the individual countries.

Using the results of cooperation in the area of automated dispatch control within the power systems of the CEMA member-nations, specialists are successfully resolving the task of gathering and processing remotely acquired data and depicting these data on display screens and other devices. They are also carrying out a retrospective analysis of remoted data and maintaining an operational record.

Based on the extensive application of computers, basic problems regarding the planning of power-system operation are being solved. Computers are likewise being used to carry out calculations regarding the prediction of power loads, to optimize operations, to calculate normal and emergency conditions and to select the parameters for adjusting the relay protection and the automatic equipment used to prevent emergencies.

At the present time, ASDU methods and equipment are being employed within the power systems of the CEMA member-nations at all levels of control (national dispatch administrations, regional control centers, substations, power stations, etc.). At the same time, the scope of the tasks directed toward increasing the reliability and operational economy of power-generating systems has expanded.

In the creation of an Automated Dispatch Control System or an Integrated Power System Central Dispatch Administration, specialists have developed and introduced a system that provides for the input and accuracy-check of the transmitted data as well as the establishment of data archives with varying file-packing depths and densities for subsequent analysis; the development (in tabular and diagram form) of operational parameters for integrated power systems and the monitoring of the technological limits of changes in them (alarm systems); the depiction of a set of current remoted data as well as detailed diagrams of substations and block diagrams of the Integrated Power System on the whole.

The operational control system increases the operational efficiency of the dispatchers at the Central Dispatch Administration and makes it possible to present sufficiently detailed information to the countries' national dispatch administrations regarding the operational status of the Integrated Power System.

The development and realization of the General Plan and the General Agreement on Cooperation in the Future Development of CEMA Member-Nation Integrated Power Systems for the Period to 1990 as well as the DTSPS [expansion not provided] for Energy, Fuel and Raw Material make it possible today to draw a conclusion about their unquestionable effectiveness and about their potential for contributing to achieving the necessary levels of electric power supplied to these countries with the

least expenditure of time and public labor. This is to be accomplished on the basis of a coordinated strategy for the development of the electric-power industry in these countries, as well as on the basis of the formulation and implementation of specific solutions, including those that make use of local efforts.

At the present time, the Permanent CEMA Committee for Cooperation in the Area of Electric Power has begun developing a concept for the future growth of the electric-power industry within the framework of the integrated electric-power systems of the CEMA member-nations to the year 2000. This is being done in an effort to coordinate economic and technical policies for the long-range development of integrated power systems.

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## NUCLEAR POWER

### CEMA OUTPUT OF MODULAR NUCLEAR-RESEARCH INSTRUMENTS DISCUSSED

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 11, 1982 pp 71-73

[Article by Miroslav Kherman, Director of Associated Plant for Nuclear Instrument-making, POLON: "The Creation and Production of Apparatus within the CAMAC System for AES's"]

[Text] CAMAC is a modular system of electronic instruments that enables data collection and processing and automatic measurement and control of a facility or process. The system was developed by the ESONE (European Standards on Nuclear Electronics) Committee, the members of which are scientific organizations from the MNK [Hungarian People's Republic], the GDR, the PRL [People's Republic of Poland], and the RSR [Romanian Socialist Republic], as well as the Joint Institute for Nuclear Research in Dubna, for the purpose of unifying the solution of questions about the automation of scientific research, mainly in the area of large nuclear-physics experiments.

The first draft of the standard EUR-4100, which defined the main parameters of the CAMAC system and the principles of operation of its single-box complexes, was published in 1969. Document EUR-4100 got final coordination in 1972. These standards have been in effect to this day. Further work has led to the creation of a number of standardizing papers and recommendations that expand the sphere of application of the CAMAC system. The possibility of building multiple-box sets of apparatus under the principle of parallel branches and sequential branches, using microprocessors that are built into individual modules of the system, is called for. Documents on a standard program for CAMAC complexes also have been developed.

The advantages of the given system have helped this apparatus to receive very wide application in various areas of scientific research and industry. A number of standards on this system have been worked out and approved within the framework of the International Electrical-Equipment Commission (IEC), and CEMA member countries have developed several national standards.

The USSR has developed and put into production a system of VEKTOR modules and instruments, sometimes called VEKTOR-CAMAC, which is distinguished by the dimensions of the constructional structure and by the connectors, with full retention of all electrical parameters and logical principles of operation of the data-transmission channels, in accordance with CAMAC international standards.

An appropriate set of elements of the system will allow various complexes to be created for collecting and processing data or for automating research or controlling production processes. It should be emphasized that complexes can be selected from standard elements produced by various plants in different countries. An example of such an assembly was demonstrated at an AN SSSR [USSR Academy of Sciences] exhibition in February 1977 in Moscow, where modules produced by the USSR, PRL and MNK, as well as several Western companies, operated in a single measuring and computing complex.

CEMA member-country collaboration in the field of developing, applying and producing CAMAC apparatus embraces a very broad circle of scientific organizations and enterprises of various countries, as well as international organizations. Interaction among them occurs in various forms. Only the main centers and the results of their work are mentioned below.

A widely known center for international collaboration in the CAMAC apparatus field is the Joint Institute of Nuclear Research (OIIYaI) at Dubna--a member of the ESONE Committee.

Since the start of the 1970's the institute has been developing various members and measuring complexes for CAMAC. Institute staff workers from many CEMA member countries, particularly the MNK and PRL, actively participate in this work. OIIYaI has now established a large number of complexes for automating scientific research in which CAMAC apparatus produced in the MNK and PRL is used. Some CAMAC developments from OIIYaI have been put into production at POLON plants in the PRL.

A large number of scientific organizations have been included in the collaboration among the academies of science of CEMA member countries. A meeting of the presidents of the academies of sciences of the socialist countries in February 1977 recommended CAMAC as the standard system for apparatus for automating scientific research. The AN SSSR, where a number of standard measuring and computing complexes (IVK's) that use CAMAC apparatus and computers of the SM [International System of Small Computers] type have been developed, played a major role in this area. The Polish-produced equipment, which is supplied by POLON plants, is used in many IVK's. Material support for these complexes was prepared in AN SSSR institutes.

The collective of CAMAC specialists, which was created in 1974 within the framework of the International Economic Association for Nuclear Instrumentmaking, Interatom-instrument, is playing an essential role in developing and strengthening international collaboration.

Each year the meetings of this collective help to exchange information about the status of scientific research, experimental-design development, and the production of CAMAC articles. The collective has organized a card index of material support for CAMAC systems and is working out proposals on programing questions. The collective's activity has influenced considerably development and the signing of supplements to the Agreement on Multilateral International Specialization in the Production of Instruments and Devices for Nuclear Equipment, which includes CAMAC apparatus. Eighty-five types of CAMAC articles that are manufactured in the NRB [People's Republic of Bulgaria], the PRL and the CSSR [Czechoslovak Socialist Republic] come under specialized production, the annual amount of deliveries comprising about 12 million rubles' worth.



Since 1970 various working organs of the CEMA Standing Commission on Collaboration in the Area of Use of Nuclear Energy for Peaceful Purposes have been occupied with questions about the CAMAC system. At first this was a working group for nuclear instrumentmaking, which prepared CEMA recommendations on the standardization of VEKTOR and CAMAC articles and systems. Scientific and technical collaboration on the topic, "The Development of Systems for Nuclear Instrumentmaking in the CAMAC Standard," is now being accomplished within the framework of Section 2 of the Commission, with a view to developing requirements and CAMAC articles for industrial use and to creating standard systems (or complexes) that operate under industrial and laboratory conditions. In 1980, Section 2 prepared the report, "On the Status of the Development of Nuclear Instrumentmaking under the CAMAC Standard with an Analysis of the Areas of Applicability of the Systems for Purposes of Monitoring and Control in Nuclear Equipment and Technology." The report cited the results of a previously prepared questionnaire, from which it followed that CEMA member countries are now producing annually more than 10,000 CAMAC functional and control modules and a corresponding number of boxed feed modules and structural members (posts, ventilation panels, and others). About 100 different types of systems (or complexes) have been developed, several tens of certain standard complexes being produced annually.

The working organs of other commissions and CEMA committees, including the CEMA Standing Commissions on Collaboration in the Field of Machinebuilding and in the Field of Radio Equipment and Electronics Industry; the CEMA Committee on Scientific and Technical Collaboration; the Intergovernment Commission on Collaboration of Socialist Countries in the Field of Computing Equipment--the Council of the Chief Designers of SM's of Computers--are occupied with questions of the use of CAMAC equipment.

In speaking about the collaboration of CEMA member nations in the area of developing and producing equipment for AES's, it should be noted first of all that the necessity for it ensues from the DTsPS [Long-Term Specific-Purpose Program for Collaboration] in the Field of Energy, Fuel and Raw Materials.

Concrete decisions on collaboration in the production of apparatus for AES's were adopted in the "Agreement on Multilateral International Specialization and Cooperation in the Production and Mutual Deliveries of Equipment for Nuclear Power Stations During the Period 1981-1990," which was signed by the heads of the governments of CEMA member countries in June 1979. On the basis of this agreement, the first contracts for the delivery of documents from the USSR on the two systems of apparatus for AES's with VVER-440 and VVER-1,000 type reactors were signed by the appropriate organizations of the USSR and the PRL back in 1979. Production was undertaken at OZYaP POLON in accordance with Soviet documentation for the GINDUKUSH system for internal reactor monitoring and the SEYVAL centralized information and computations system for radiation monitoring, under a plan schedule that arises from the agreement signed in 1979.

The CSSR, based upon technical data obtained from the USSR, is developing and preparing for production apparatus for monitoring neutron flux. This equipment will be shipped to AES's with VVER-1,000 type reactors that will be erected in CEMA member nations.

It should be emphasized that the collaboration of CEMA member countries in producing nuclear-physics apparatus for AES's is being performed on the basis of contracts.

Scientific and technical collaboration in the field of developing apparatus for AES's is being performed in accordance with certain programs and plans, in accordance with which it is planned to accomplish modernization and improvement and to develop new and more improved systems. A model design for an automated system for monitoring and controlling power units, which is the topic of the more general problem, "The Mastery of Power Units That Have the VVER-1,000," is being created within the framework of the International Economic Association, Interatomenergo, and Section 5 of the Commission. The development of nuclear apparatus for monitoring and controlling the power reactors and for monitoring the radiation safety of AES's is one of the topics of scientific and technical collaboration in Section 2. The purpose of this work is to develop technical tasks for improving existing types of apparatus for AES's that have VVER [water-moderated water-cooled electric power reactor] type reactors. This section also contemplates collaboration in the area of metrological support for apparatus for nuclear instrumentmaking for AES's.

Certain distinctive features of international collaboration in the area of developing apparatus for AES's must be noted:

a large number (several dozen) scientific-research and technical organizations of all CEMA member nations are participating in the work;

work that embraces a very broad field, in the form of many subsystems, is aimed at a single-purpose--the creation of a model automated system for monitoring and controlling a power unit that has a VVER-1,000;

concrete targets have been set for various tasks--the creation of apparatus and systems that will be put into production and are intended for AES's in CEMA member countries; and

it is planned to perform various tasks on an international scale on a contract basis, which will help to increase the work's effectiveness.

In conclusion, let us dwell on examples of the use of CAMAC and VEKTOR apparatus in systems for AES's and TES's.

The USSR's All-Union Scientific-Research Institute for Instrumentmaking developed a system for monitoring within VVER-type reactors. This system, called GINDUKUSH, was created on the basis of apparatus and the standard communications channel for VEKTOR. It performs the following tasks: the collection of information from analog and discrete signals from sensors; the conversion of the information collected into digital code and storage of the information converted; the execution of arithmetic and logical operations; the recording of information in a punching unit and on punched tape; the presentation of alphanumeric and graphic information on a display; and the exchange of information with the central computer.

The GINDUKUSH apparatus can accept and transform about 850 analog signals, about 500 discrete signals, and several signals in binary code, in accordance with a program. It can accept analog signals of a very low level (on the order of a fraction of a microampere and of millivolt units), and it provides very great precision in the measurement of these signals ( $\pm 0.25 + 0.5$  percent). The apparatus is characterized also by increased immunity to industrial interference that is created within the AES.

The PRL has developed and is testing an information and computational system for controllers of 360-MW power units at TES's built on the basis of CAMAC apparatus, using microprocessors. The conception and technical tasks for the system were developed by the Institute of Automatic Equipment for Power Systems in Wroclaw. The apparatus was manufactured at the POLON Plant for Electronic Equipment in Warsaw (where several modules were developed specially for this system). The program was prepared by the Institute of Nuclear Research in Sverk. The system is known by the name KSWDB-360; it solves these tasks: the collection of information from sensors of analog and discrete signals; the transformation of the information collected into digital code and storage of the converted information; the conduct of arithmetic and logical operations; the recording of information on printers and punched tape; and the presentation of alphanumeric information on a display. The KSWDB-360 can accept and transform about 770 analog and about 1,470 discrete signals, in accordance with a program.

The apparatus is marked by the use of microprocessors, made up in the form of CAMAC modules, the principle of "distributed" intelligence, and two levels of data processing.

Also well known is the system developed in the MNK for the centralized control of 215-MW power units at TES's. It also was created on the basis of CAMAC equipment and it carries out the task of collecting, processing and presenting information obtained from 300 analog and 480 discrete sensors.

All these systems were developed by individual scientific-research organizations in different countries. The plans for scientific and technical collaboration by the states of socialist friendship are aimed at creating common efforts for new and improved systems for nuclear-physics apparatus for AES's, using the experience of various countries in the application of modular systems.

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## NUCLEAR POWER

### NEW CAPACITY OPENED AT HUNGARIAN NUCLEAR PLANT

Moscow PRAVDA in Russian 3 Jan 83 p 4

[Article by V. Gerasimov, PRAVDA correspondent in Budapest: "Nuclear Paks"]

[Text] On the eve of the new year, the nuclear power plant in Paks produced power and the first 440-megawatt unit went on line. Power was delivered into the state grid.

I well recall that clear autumn day when a cylinder of stainless steel with a letter to future generations and with newspapers including also PRAVDA was lowered to the bottom of the pit. That was on 3 October 1975, at the small village of Paks when construction on the nuclear power plant started. Today, together with the chief representative of the Hungarian government in the town of Paks, Benjamin Szabo, I leafed through the old albums where this memorable, solemn day was recorded. Benjamin Szabo is a graduate of the Moscow Power Institute and at the end of the 1960's was put in a group which selected the site for the plant. He conducted research and later on did design work with Soviet specialists from Kiev.

"This project brought together thousands of people and many production collectives from the fraternal nations," said B. Szabo. "Paks for us has become a true school of cooperation, it has taught us to cooperate better, to allocate forces and to find new ways for strengthening specialization and cooperation in the nuclear machine building of the CEMA nations."

The project is truly international. The VVER-400 reactor was manufactured at the Czechoslovak Skoda Combine according to Soviet plans and with the participation of Soviet specialists. The two 220-megawatt turbines for it arrived from Kharkov. Soviet plants delivered the steam generators, the pumps and other large equipment, instruments and electronics. The special cranes were manufactured in the GDR. Bulgarian enterprises provided the safety equipment. Poland delivered heat exchangers. More than 100 Hungarian enterprises were involved in the deliveries. For example, at the Ganz-MAVAG Combine, in a specially dug 20-m silo, the telescopic arm of the loading equipment manufactured under Soviet designs was assembled and set up for Paks. Controlled by TV cameras, this "hand" performs operations deep in the reactor with the precision of a millimeter. In addition, Hungary has begun to specialize in producing transport-production "lines," water treatment equipment and special repair mechanisms.

During the night of 27-28 December 1982, the turbines of the first unit resolutely took a breath as if marking the start of their life. We were standing opposite, on a high walkway. The handrails shook slightly. Down below the network of numerous pipelines glowed and the intertwinings of structures and overhead cranes stood out in blue enamel. The installation workers wore yellow, white, blue and green helmets. The entire gigantic room seemed decorated in a holiday mood. And a holiday had truly arrived at Paks. This could be felt in the elevated mood of the people, workers from various CEMA countries who were completing a major stage of the work.

During these days congratulations had been received by the energetic and enterprising director of the construction enterprise No 22, Kalman Totu, and the insistant, always confident work superintendent Imre Zetli who had erected the metal structural elements of the main building. Of course, out of the 10,000 workers employed in Paks, one could mention hundreds of other workers and pace-setters of the socialist competition. Standing next to me were those who had skillfully set in place the 12-m reactor cylinder using a special 320-ton Hungarian-Bulgarian crane. These were Sandor Halmos and Istvan Joche. Alfred Vamos had been in charge of installing the piping. The name of the welder Lazlo Varga is well known in Paks. And recently there has been much excitement for Zoltan Neukom, the chief engineer for electrical installation and the leader of the starting-up work, Janos Marton, and their Soviet partners, Viktor Grigor'yevich Dubrovin and Viktor Pavlovich Nikitin.

Many Hungarian specialists, workers and installation workers had repeatedly traveled to the USSR for training and to a special training center in the GDR.

"We once estimated," Benjamin Szabo told me, "that the Paks workers had spent almost 40,000 man-days in practical training in the Soviet Union. In addition, we have around a hundred engineers who completed Soviet technical VUZes."

In Paks the Soviet specialists are carrying out the important task of not only helping in the complete installation of the equipment, the starting up and adjustment of it, but also in training a new detachment of nuclear power engineers.

Ivan Vasil'yevich Prokopenko arrived in Hungary in 1978. Behind him was the construction of the Novovoronezhskiy AES and the starting up of the Armenian AES, almost 20 years of experience. The Hungarian designers and installation workers speak with gratitude about the engineer from the Novovoronezhskiy AES, the native of Odessa, Aleksandr Aleksandrovich Semyakin. We walked with him through the halls and glanced into the control room. He was greeted with a friendly smile, a courteous word and also a professional question.

The Hungarian workers mentioned with approval the Soviet welding aces Viktor Alekseyevich Danilov and Vasiliy Mikheyevich Polovinkin. In Paks they decided to hold a competition for the welders who had come from the CEMA countries. These men won first and third places. They knew the theoretical questions well and the carrying out of the assignments was "excellent." The Soviet welders worked in the most difficult areas and on the most difficult seams.

...Rising next to the first unit are the cast walls of the second. By 1986, the third and fourth units should be in operation. The total capacity of the plant will reach 1.76 million kilowatts. It will provide 24 percent of all the energy produced by the nation.

"For us the 1983 tasks are great," said I. Prokopenko. "The equipment of the second unit will be installed and efforts are being concentrated on the most important stages. We are endeavoring to even better coordinate the labor of all our international subdivisions."

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## NUCLEAR POWER

### CONNECTING OF SMOLENSK NUCLEAR POWER PLANT TO GRID DESCRIBED

Moscow TRUD in Russian 26 Dec 82 p 1

[Article by V. Kapel'kin, TRUD correspondent at the construction of the Smolensk AES in Desnogorsk: "A Turnkey Power Project!"]

[Text] "Three hundred thermomegawatts in the apparatus!" commanded the senior chief of the AES shifts, D. Krivoy.

The SIUR or senior reactor control engineer, L. Polikarpov, was doing his wizardry at the control buttons and deep in the reactor, or as it is called in the profession, the apparatus, the reaction was becoming more intense. A glance at the instrument showed that the figures for the megawatts of heat were jumping and rising to 300.

The SIUR was all attention. You won't find him turning his young beard bordered face to you. There is no time for this. It is essential to carefully make certain that the heat is generated evenly in the reactor and not in any one part.

The steam was ready.

The turbine was being turned slowly by a small shaft-turning engine so that the hot rotor did not bend by its own weight.

The first jolt should tell a great deal. On the turbine's body pick-ups had been fastened here and there and instruments had been readied. But not all of them are more effective than human feelings. In the hands of the turbine workers were "listeners" in the form of aluminum tubes with a point on one end and flat earpieces on the other.

The order was given to the chief of the turbine shop shift I. Teslenko to open the main steam gates.... A fluid hot stream burst into the 40-m body of the turbine. But nothing could be seen from under the hermetic casing through the joints of which not a single jet of steam broke out. I missed the moment of the jolt. I saw the deputy chief of the turbine shop A. Tokarev staring at the tachometer scale while the turbine workers with their listeners in hand ran from bearing to bearing. Over 200 tons of metal--the shaft, the turbine vanes and the generator rotor--were turning easily as if spontaneously.

Everyone had arrived for the starting-up. The deputy chief engineer of the plant Ye. Safrygin had disregarded his 45th birthday. The chief of the turbine shop V. Chukharev was ill, but did not stay in bed. All around stood the familiar faces of the construction workers, installation workers and fitters.

Then the turbine had reached its rated speed of 3,000 rpm.

The culmination of the starting was the connecting of the generator to the grid. This was far from simple. The oscillations in the alternating current in the network and generator should coincide. The new generator capacity could be likened to an additional locomotive which should instantaneously be put to work. Clearly the speeds should be the same. Otherwise a collision was inevitable.

As it was, both generators of the first unit were connected to the grid by the shift chief of the electrical shop K. Martynov. Konstantin Viktorovich [Martynov] who in his free time participated in the amateur theatrics was now all business. It was a crucial moment! It was the "rough" tuning with the black arrow of the synchroscope describing lazy circles. The turbine's speed was altered by an imperceptible amount.... And then the adjustment was "precise" with the arrow slowing down.

At the very moment that the arrow stood over a blue dot--approximately where the hour hand of the chronometer showed 1230--the main key was turned.... There was applause and congratulations.... Rising above them was the solemn voice of Ye. Safrygin who had directed the start:

"Comrades, allow me to congratulate everyone. The first unit of the Smolensk AES is in full operation."

Let us note the time: 0054 hours on 22 December, the start of Power Day. Invitations to a ceremonial evening continue to lie on the desk in the control panel room. With the chief of the plant's electric shop, V. Pavlov, I approached the main counters which recorded the plant's energy. They looked like ordinary apartment meters. Vyacheslav Dmitriyevich [Pavlov] explained, pointing to a table with conversion factors: the meter readings must be multiplied by 720,000. The meter of the second generator had just begun to add up its millions and the first had been working since 9 December. We estimated that more than 75 million kilowatt hours of electric power had already been produced. Where was the current of the first unit going?

...With the foreman of the switching equipment V. Golovinskiy, I was standing underneath the bioprotective grid (as they say, the electrical field is such that it will knock your hat off). Vladimir Yegorovich [Golovinskiy] pointed to the large power transmission supports disappearing into the darkness: "In accord with the demand, two-thirds of the energy is now going to the regions of the Center and a third to the system of the Southwest." A specific contribution to the nation's economy!

By morning, everyone knew about the starting.



The current in the network was the result of the enormous labor by a large collective of construction and installation workers and operating personnel. How to show its scale? The first unit is more than 60 major installations with a half-billion rubles of utilized capital investments. And everywhere--from the gigantic main building with its 1,100 rooms to the distant water intake--a militant competition had been initiated, a struggle for pace and quality.

The contracting collective of the Smolensk AES had established a high standard for the turnkey delivery of enormous and complex projects.

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## NUCLEAR POWER

### STARTING OF SMOLENSK NUCLEAR POWER PLANT REPORTED

Moscow SEL'SKAYA ZHIZN' in Russian 22 Dec 82 p 4

[Article by V. Goryaynov: "The Atomic Heart Has Begun to Beat"]

[Text] Beloyarsk, Voronezh, Kursk.... Now, this year, another one, the Smolensk nuclear plant has appeared. The largest of the nuclear power plants presently under construction has produced its first current.

This event was preceded by intense labor on the part of the 15,000-strong collective of construction and installation workers and operational personnel. The people of Smolensk greeted with joy the new news from the headquarters of the all-Union shock construction project: a physical start had been achieved. The nuclear reactor had been fueled and tested. The turbines had been started up. The generators had been connected.

"When preparations were in full swing for starting up the first power unit of 1 million kilowatts," related the director of the AES, G. Kopchinskiy, "the construction workers and operational personnel were interested in how the testing of the equipment and systems of the plant were going. The total designed capacity of all the units of the power complex developed by specialists of Gidroyekt [All-Union Order of Lenin Design and Scientific Research Institute for Hydropower Projects] equals 7 million kilowatts.

The first turbogenerator was put under a load. The arrows quivered on the modular control panel, informing the duty operators that the heart of the AES had begun to beat in a healthy, continuous rhythm. The shift of V. Cheprasov carefully watched the instrument readings. The power of the turbine was brought to 150,000 kilowatts. The load was growing. The arrow passed through the figures of 200, 250, 300.... Then the instruments showed 350,000. The turbogenerator was operating normally. Electric power from the Smolensk AES began to be delivered to the Unified Power System of the nation.

The present year to some degree has summed up the great work of the construction collective. For many of them the Smolensk AES is the first such project. The CPSU obkom devoted great attention to the erection of the plant in following the course of construction. Next to the AES there grew up a settlement of power construction workers and operators, Desnogorsk. A fine dam was erected and a large reservoir flooded.

Next to come is the following power unit. At present, there are more than 30 subcontracting organizations under the AES construction administration. They are all carrying out the designated work on time and even ahead of time. The brigade of communist labor under the leadership of V. Demidov completed 2 weeks ahead of time the preliminary assembly of the final unit of the second reactor, the biological protection unit with a total weight of over 600 tons. At present, in the assembly area the collective is fitting the assembly connections for welding. The reduction in the time of the assembly work has been achieved by improving the fittings and attachments employed in assembling the first reactor. The brigade leader himself has been recognized as the best rationalizer at the Desnogorsk Installation Administration.

A brigade of finishing workers who are the winners of the socialist competition for the results of the third quarter and headed by V. Barteneva has put the final polish to the plant's unit control panel room and is finishing the work in the elevator unit of the main building. The collective in installation workers headed by V. Osokin from the Smolensk SMU [construction-installation administration] of the Tsentroenergomontazh [Central Power Installation] Trust, has concluded work on the second turbogenerator and has provided an opportunity for the operational personnel to test it and then put it under load. Everyone is confident that the second turbine will operate just as flawlessly as the first.

During the remaining days until the end of the year, each construction collective is endeavoring to successfully carry out the plan. All the participants in construction are clearly aware that in the current five-year plan, much hard work remains to put the second power unit in operation.

...It is an ordinary watch for the operational personnel and workdays for the construction and installation workers. But in the characteristic roar of the construction project, the sound of the operating turbine and scores of pumps adds a holiday note and one can hear the precise commands given over the loud-speaker system to the service personnel. In a word, the construction workers have made an excellent gift for their professional holiday, Power Day, and to the 60th anniversary of the formation of the USSR.

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## NUCLEAR POWER

### CONSTRUCTION PROGRESS AT GORKIY NUCLEAR HEATING PLANT

Moscow GUDOK in Russian 17 Dec 82 p 4

[Article by V. Yudanov, correspondent of the newspaper LENINSKAYA SMENA from Gorkiy: "The Nuclear 'Boiler'"]

[Text] The Gorkiy nuclear heat supply plant is still under construction. This will be a "boiler" of enormous capacity operating on nuclear fuel. It is the first prototype in the network of heat supply plants which will cover the nation. With the completion of the plant, we will be able to close down in the upper, old part of the city on the Volga several-score boilers which heated residences, institutions, schools and industrial enterprises. The nuclear plant will produce enough heat for an entire city with a population of over 350,000 residents!

All of this is not far off. The walls of the plant's main building are going up near Gorkiy in the suburb fields. Work is in full swing everywhere: on the 40-m walls of the main building, in the lower floors and on the rail spurs where they are unloading intricate metal structural elements and reinforced concrete products. Overhead, from the wall of the reactor room, one can have a panoramic view of the site: the reinforced concrete buildings, the walls of some of which are up to 3 m thick, the crane booms, the corridors of the service and subsidiary rooms and the pipelines through which heat will flow to the city.

The scale of the project is enormous: merely the design and estimate documents weigh a ton and a half.

The plant guarantees complete safety against radioactive radiation and the preservation of the environment. At the same time the closing down of the presently existing small boilers will make it possible to clean up the air basin into which a significant amount of ash, sulfur dioxide and nitrous oxides is released along with the smoke. The heating lines will be constantly monitored by a dispatcher point which is equipped with modern automatic, remote control and communications equipment.

No major construction project can get by without aid from the railroad workers and the transport construction workers. This is also the case in Gorkiy. The construction outlines of the nuclear boiler had just been marked out when the workers from the SMP-167 [construction-installation train of the Gortransstroy

[Gorkiy Transport Construction] Trust had already built spurs to the project from Royka Station.

"We completed the laying of four spurs with a total length of 5½ km and two tracks in Royka ahead of time," said the train's chief N. Khokhlov.

Adding to what he had to say was the manager of the Gorkiy Construction-Installation Trust which was erecting the nuclear heat supply plant, N. Firsov:

"The transport construction workers have completed the laying of the spurs and developing Royka Station quickly and with high quality. We have not even had to make postlaying repairs on the tracks. The superstructure with the gravel foundation and the rail-tie grid has been made following the best models. There have been neither subsidances, swells nor pits...."

"But how are the railroad workers serving the project?"

"We cooperate closely with them. Particularly with the traffic controllers of Royka and Kudma Stations. The construction workers consider the chief of Kudma Station, G. Zabavina, their first assistant. She will not sleep at night, she sacrifices her day off, but does everything so that the freight for the project is delivered to the spurs on time and quickly unloaded. But we also do not remain in debt to the railroad workers as we promptly unload the cars and provide them with help in minor routine repairs."

The arriving construction materials are unloaded not only at the project itself, but also at Kudma Station. At any time of the day, both on the spurs and on the specialized tracks, one can meet the station chief G. Zabavina and the freight receivers T. Priyateleva and G. Yefremova. They help organize the unloading.

With each day the pace of construction is growing at the nuclear heat supply plant. This has been particularly high in building the main building where the two nuclear reactors, the control panels and the auxiliary services are to be located. The time is not far off when the atom-heated water will rush powerfully through the city heating system.

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## NON-NUCLEAR POWER

### DEVELOPMENT OF UZBEK POWER SYSTEM REVIEWED

Moscow ENERGETIK in Russian No 11, Nov 82 pp 13-14

[Article by Kh. F. Gaybullayev, Uzbek Deputy Minister of Power and Electrification: "The Development of Power in Uzbekistan--Loyalty to the Principles of the Leninist GOELRO Plan"]

[Excerpt] Prior to the Great October Socialist Revolution, Uzbekistan, the territory of which was part of the Turkestan Region, in essence did not have its own industry and was merely a raw material fief of Tsarist Russia. The total capacity of the power system of Turkestan in 1914 was 22,400 hp with 496 mechanical engines, including 51 engines installed at power plants.

Over the last 5 years, intensive construction has continued on the projects in the series of Middle Chirchik GES.

In the power system great attention has been devoted to developing automated control systems and to broadening their technical base by creating a large computer center with diverse peripheral and terminal equipment. A qualitatively new feature in the ASU [automated control system] of the Uzbek Power System is the providing of a dialogue solution to the problems of operational dispatcher control and the creation of an information-reference system. A subsystem "Technical and Economic Planning" has been created and this encompasses all planning stages: operational (monthly with a breakdown for 10-day periods, weeks and days), current (annual with a breakdown by quarters and months) and long-range (5-year with a breakdown for the years). The bases have already been established for creating the third stage of the Uzbek Power System ASU.

In raising the republic's power potential, a special place is held by the 11th Five-Year Plan. The program outlined by the 26th CPSU Congress and the 20th Congress of the Uzbek Communist Party to provide more rapid development rates for power and electrification of the national economy is successfully being carried out.

At the start of 1982, the installed capacity of the thermal and hydropower plants of the Uzbek Power System was 9.3 million kilowatts, including 0.59 million kilowatts which were completed in 1981.

Over the remaining years of the 11th Five-Year Plan, 0.96 million kilowatts of capacity are to be completed, including 0.6 million kilowatts at the Novo-Angren GRES as well as at the Mubarek TETs and the Andizhan and Tuymuyun GES.

There are also plans to complete the 500-kilovolt power transmission line between Karakul and Guzar, some 300 km long. The Unified Power System of Central Asia and Southern Kazakhstan will be connected to the national United Power System.

On the eve of the 60th anniversary of the GOELRO [State Commission for the Electrification of Russia] Plan, Comrade L. I. Brezhnev commented that the Soviet people are rightfully proud of the successes of Soviet electric power which presently holds leading positions in the world. "All the successes have been possible due to the unceasing concern of the party for developing this most important economic sector. They show the great triumph of Lenin's ideas set down in the GOELRO Plan."

In close cooperation with the other Union republics, Uzbekistan is steadily embodying Lenin's ideas for the electrification of the nation.

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## NON-NUCLEAR POWER

### INCREASED POWER CAPACITY OF GEORGIA EXAMINED

Moscow ENERGETIK in Russian No 11, Nov 82 pp 14-15

[Article by Yu. Ye. Chediya, Chief of Gruzglavenergo: "Georgian Electric Power Over the Years of Soviet Power"]

[Excerpt] The prerevolutionary power system of Georgia was very little developed. At the end of 1913, the capacity of all the Georgian power plants was around 9,000 kilowatts and the annual production of electric power did not exceed 20 million kilowatt hours. By the time of the victory of Soviet power in the republic (1921), the capacity and, respectively, the output of electric power had declined by more than 2-fold in comparison with 1913.

Regardless of such high development rates, the achieved level in Georgian electric power still does not meet the increased needs of the republic economy. The power-to-labor ratio in industry is approximately 75 percent of the average Union level, and in agriculture, just 25 percent.

In accord with the decisions of the 26th CPSU Congress, the Georgian power workers have worked out and are implementing a comprehensive program of measures to eliminate the disproportions in the development of the electric power base and to sharply raise its technical level.

A particularly important problem for republic electric power is the further development of the base capacity. One of the basic ways for solving this problem has been the prompt elaboration of plans and the start of construction on a nuclear power plant in Georgia.

Equally important is the development of the republic's power grid system. The existing intrasystem links do not ensure the necessary reliability of power supply for major regions (Abkhaziya, Adzhariya, the south of Ossetia, Kakhetia, Svanetia and others) as well as for the major cities of the republic (Tbilisi, Kutaisi, Sukhumi, Batumi, Tskhinveli and others). More than 30 rayon centers do not have two-way power supply and over 100 substations for an extended period of time have been operating with one transformer.

During the current five-year plan, we intend to sharply increase the pace of electric grid construction. In order to increase the dependable operation of the power system, to provide reserve capacity and the ringing of supply for



consumers, for reconstructing the worn-out power transmission lines and substations as well as for reducing the consumption of electric power in transporting it and improving the quality of the electric power, we intend to build 1,700 km of overhead lines of 35 kilovolts and more and to put into operation 4,285,000 kilovolt-amps of transformer capacity. At the same time the share of system-important projects, that is, the overhead lines and substations with 220 kilovolts of voltage and more, should also grow significantly.

The efforts of all the republic power organizations are aimed at carrying out the designated tasks, and primarily Gruzglavenergo [Georgian Main Power Administration], the Gruzgidroenergostroy [Georgian Hydropower Construction] and Kavkazelektroset'stroy [Caucasus Electric Grid Construction] Trusts, the Georgian Division of Energoset'proyekt [All-Union Order of the October Revolution State Design and Scientific Research Institute for Power Systems and Electric Grids] and the Tbilisi Division of Hidroproyekt [All-Union Order of Lenin Design and Scientific Research Institute for Hydropower Projects]. The great acquired experience in the designing, construction and operation of the power plants, substations and power transmission lines, the availability of skilled engineers and technicians and the technical equipping of these organizations make it possible to be confident that the most difficult tasks related to the development of the Georgian Power System will be successfully carried out. The close-knit collective of Georgian power workers will worthily celebrate the 60th anniversary of the formation of the USSR.

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## NON-NUCLEAR POWER

### GROWTH OF ARMENIAN POWER SYSTEM TRACED

Moscow ENERGETIK in Russian No 11, Nov 82 pp 15-16

[Article by F. Kh. Akopdzhanyan, Chief of Armglavenergo: "The Development of Armenian Electric Power"]

[Excerpt] The power resources of Armenia are represented only by the hydropower of small mountain rivers. The capacity of the small hydropower plants and diesel plants in 1913 was 3,165 kilowatts with an annual output of electric power of 5.1 million kilowatt hours.

At present, the entire territory of the republic is covered by electric grids of varying voltages. They provide all consumers with centralized power supply.

The main power transmission lines linking the basic generating installations and the corresponding step-down substations operate on a voltage of 220 kilovolts. Electric power is distributed in the grids with a voltage of 110, 35 and 6-10 kilovolts.

The 6-kilovolt voltage is gradually being replaced by 10-kilovolt voltage. The household consumers have been completely converted to a voltage of 220 volts. Electrification of the republic was completed in 1964.

In the power system, the technical level of production has been constantly rising. At all the hydropower plants, the starting and stopping of the units have been automated and at certain GES these processes over telemechanical links can be carried out by the power system dispatcher. Modern high-speed safety devices have been incorporated in the high-voltage power grids.

There have also been significant successes in the use of telemechanics and computers. At present, all the 220-kilovolt plants and substations have been telemechanized. Some 70 percent of the telemechanical equipment in the power system is modern pulse-code and time-split devices which have great reliability and resistance to interference.

At the end of 1979, the first stage of the ASU [automated control system] for the Armenian Power System was put into operation. The operation of over 70 operational-dispatcher, production-technical, general control and other programs makes it possible to most rationally and optimally carry out the daily tasks arising in controlling the republic's complex power system.

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## NON-NUCLEAR POWER

### LATVIAN SERVICE FOR RURAL POWER SYSTEM DESCRIBED

Moscow ENERGETIK in Russian No 11, Nov 82 p 32

[Unattributed article: "A Service for Power Services in Latvian Agriculture"]

[Text] The Latvian Council of Ministers by its decree has felt it advisable to set up as part of the republic Goskomsel'khoztekhnika [State Committee for the Supply of Production Equipment for Agriculture] a service for energy services for agriculture. It has been assigned the functions of ensuring the prompt and complete carrying out of work related to the technical maintenance and routine repair on power and electrical engineering equipment and utilities (heat and water supply pipelines, sewage and waste-water pipelines), technical maintenance for the heating boilers of residential buildings, including the production of the Lyvan Housing Construction Combine, all rural treatment works as well as the further development of electrification and heat supply, ensuring the rational and economic use of the power resources on the kolkhozes, sovkhoses and other agricultural organizations of Latvia.

The republic Council of Ministers has obliged the Latvian Goskomsel'khoztekhnika to set up as part of its central apparatus an administration for power supply of agriculture; within each rayon association there is to be a station for the power services for agriculture in terms of the standard staffs of the stations for the technical maintenance of equipment on the livestock farms, as well as a republic laboratory for the power services for agriculture, having put this under the Administration for power service for agriculture of the Latvian Goskomsel'khoztekhnika.

The republic Goskomsel'khoztekhnika has been instructed to work out and, with the approval of the Latvian Ministry of Agriculture and the Latvian Main Production Administration for Power and Electrification, to approve a regulation on the service for power service for agriculture.

The Latvian Ministry of Finances has been ordered, in drawing up the proposals for establishing the limit on the number of management personnel and the limit allocations for this personnel for the Latvian Goskomsel'khoztekhnika, to consider the creation in the republic of a service for energy services for agriculture, including the creation of an Administration for Power Services of Agriculture with up to 22 personnel units, as part of the central personnel of the Latvian Goskomsel'khoztekhnika.

The Latvian Gosplan and the republic Goskomsel'khoztekhnika have been instructed, in working out the draft annual plans, to annually examine the possibility of increasing capital investments to create facilities for the service for power services for agriculture.

The Latvian Gosplan has been instructed to provide in the annual draft plans for the following: the assigning of motor transport to the Latvian Goskomsel'khoztekhnika for handling the amount of work of the service for energy services for agriculture; satisfying the needs of the Latvian Goskomsel'khoztekhnika for material and technical resources for technical maintenance and routine repair on the power and electrical engineering equipment and utilities in agriculture; the assigning to the Latvian Goskomsel'khoztekhnika annually 20 graduates from technical schools in the specialty "Agricultural Electrification" for working in the system of the service for power services for agriculture.

The Latvian State Committee for Vocational-Technical Education has been charged with annually training 25 electricians for working in the system of the service for power services for agriculture.

The republic Gossnab has been ordered to make available to the Latvian Goskomsel'khoztekhnika electrical installation products, lighting equipment and monitoring and metering devices for the needs of technical maintenance and routine repairs on agricultural electrical equipment.

Major overhaul on the agricultural internal power grids has been kept for the Main Latvian Production Administration for Power and Electrification [Latglavenergo]. Latglavenergo in 1982 and in subsequent years is to repair 9,000 electric motors a year for republic agriculture.

The Latvian Ministry of Agriculture, together with Latglavenergo, the Latvian Goskomsel'khoztekhnika and the Latvian Gosplan, has been instructed to review and resolve the question concerning the repair of welding transformers and converters.

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## NON-NUCLEAR POWER

### LONG-RANGE DEVELOPMENT OF CENTRAL HEATING SYSTEM IN SVERDLOVSK VIEWED

Moscow ENERGETIK in Russian No 11, Nov 82 p 33

[Unattributed article: "The Development of Heating Supply in Sverdlovsk Up to 1990"]

[Text] A scheme for heat supply for the city of Sverdlovsk up to the level of 1990 has been submitted for review by the Scientific and Technical Council; the plan was worked out by the Urals Division of VNIPIenergoprom [All-Union Scientific Research and Design Institute for the Power Industry].

The existing thermal loads of the city are covered by five TETs, including the Middle Urals GRES, a rayon boiler and 132 industrial and 184 municipal boilers. The maximum output of heat from these sources has been 5,450 gigacalories per hour.

At present, in the eastern part of the city, the Novo-Sverdlovsk TETs is being built with an electric capacity of 600 megawatts and a thermal capacity of 1,080 gigacalories per hour.

The plan envisages a maximum possible reduction in the number of boilers. Total consumption by 1990 will be: for hot water 8,420 gigacalories per hour and for steam 2,620 tons per hour.

Considering the completion of the Novo-Sverdlovsk TETs and the sharp reduction in the number of municipal boilers as well as the disassembly of the worn-out and obsolete equipment, in 1990, we expect a heat shortage amounting to 1,200 gigacalories per hour. In order to cover this, the plan envisages a number of variations.

The Scientific-Technical Council has adopted a decision to expand the Middle Urals GRES, putting into operation two gas-fired T-250-300-240 central heating units, with the construction of a peak water heating boiler on the line between the Middle Urals GRES and Sverdlovsk. According to the approved plans, the other heat sources will also undergo a certain expansion.

The length of the new mainline heating networks will be 76.5 km. An open heat supply system has been adopted.

In the aim of creating a workable system for monitoring and controlling the hydraulic and thermal conditions in the heating networks and city heat supply as a whole, in the following design stages, provision has been made for the following:

- 1) Increased capacity of the hot water storage tanks to an amount equal to ten times the average weekly water consumption for hot water supply for the heating season;
- 2) The introduction of an automated dispatcher control system for the heat sources and the main heating lines with the building of a central dispatcher point;
- 3) The connecting of the newly built distribution networks and heat-using units through group thermal substations (points) with an increased thermal capacity of around 10-20 gigacalories per hour with two-way electric supply and heat delivery from heating networks equipped with an automated and tele-mechanical system.

The VNIPIenergoprom, together with Soyuztekhenergo [ All-Union Administration for Power Engineering] has been instructed to work out plans for organizing the operation of the heat supply system for the city of Sverdlovsk, having reviewed the entire complex from the heat source to the consumers, inclusively.

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## NON-NUCLEAR POWER

### EQUIPMENT TESTS COMPLETED ON KURPSAYSKAYA GES ROTOR

Moscow SOVETSKAYA KIRGIZIYA in Russian 27 Oct 82 p 1

[Article by S. Ogibalina: "Operation 'Pole'"]

[Text] High-voltage testing on the rotor for the last (the fourth) unit of the Kurpsayskaya GES has been completed.

The dawn scarcely touches the mountain peaks, having lit up their contours on the east, when a long line of buses leaves Kara-Kul'. Mighty KamAZ [Kamskiy Motor Vehicle Plant] and KrAZ [Kremenchugskiy Motor Vehicle Plant] trucks, cement trucks and other equipment stop and move over to the shoulder to let pass the column hurrying to Kurpsay. An hour and a half later, the buses reach the hydroelectric power station site and deliver the regular shift hydraulic construction workers to their work places. A new working day begins.

In the GES equipment gallery, one first encounters the massive, impressive hulk of the rotor. According to tradition, the rotor for the fourth unit, as was the case with the others, is being assembled on a small area near the entrance. It is abandoned only a few minutes between shifts. The rest of the time during the day, the complex mechanism is constantly the center of attention for installers of Victor Zemskiy's brigade, one of the best in the Central Asian administration of the trust "Spetsgidroenergomontazh" [Special Hydraulic Power Installation]. Victor and his co-worker Valeriy Shchekinov, from whom the brigade leader takes over the shift, are walking around the site, verifying how much work was completed and noting what is left to be done.

The rotor's appearance changes to the eye. Several days ago, when they were putting in a bushing and the brake disc with a surveyor's level, when they were selecting the rotor iron, no one imagined, if you will, even in the bravest suppositions, that the installers would begin pole installation within 10 days. And although they have grown accustomed to record speeds at Kurpsay (it is not without good reason that the hydroelectric power construction is ahead of schedule), the collective "Spetsgidroenergomontazh" must be given its due. Even during assembly of the rotor for the first unit, which was done under an extremely tight schedule, these operations took up twice as much time.

People are at their places and work is boiling. The fiery cascade of sparks pouring out from under the polishing machine falls like red fire-works. It is not easy to work with such a machine. The high rotating speed of the polishing disc make it capricious and difficult to control. If the installer does not watch what he is doing there will be trouble. However in the skillful hands of Nikolay Aleksenko, Kolcharo Kolpakov, Rishat Sunchalin and other specialists, the tool obediently removes the smallest (within fractions of a millimeter) burrs and smoothes the unevenness in the metal. Polishing the rotor rim is the most critical stage before installation of the magnetic poles.

The poles themselves (bulky iron packets with an elaborate "filling" weighing many kilograms) lie in a high pile next to the rotor. Valeriy Isakov and Anatoliy Kondrashov, repairmen from the Toktogul'skiy sector of the "Sredazelektromontazh" trust did the high-voltage tests on them and came away satisfied with the results. Each pole undergoes the last test one after another, and suddenly, a hang-up. The instruments show a current leakage. Installers Nikolay Narenko, Zulfar Akhmed'yanov and Viktor Satanovskiy start to look for the cause.

Meanwhile polishing the rotor rim is completed and the installers have used compressed air on it again. Now one may be certain that not even the smallest metallic dust particle or filing will cause a short.

The work is moving ahead well. Victor Zemskiy, Aleksandr Nesterov and Zulfar Akhmed'yanov and Nikolay Narenko, who have already corrected the fault in one of the poles, affix the first magnetic pole which had been readied for installation. Crane operator Galina Bezrukova carefully lifts it a little bit and slowly carries it over above the site to the place where it will be installed. Several wearisome minutes and the pole, having slipped along the rim, settles firmly into place. It is wedged in and they start to work on the second.

V. Zemskiy's brigade installed the magnetic poles during two shifts, and when all was ready, insulated the connections. The specialists from "Sredazelektromontazh" [Central Asian Electrical Installation] again occupy themselves with the rotor. They have yet to make high-voltage tests of the mechanism which has already been assembled. Some time passes and the tests show that everything is in order, the rotor is ready for operation. Now the painting and other operations remaining before the most important one--installation of the rotor in its working place--can begin.

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## NON-NUCLEAR POWER

### CONTROL EQUIPMENT INSTALLED IN KURPSAYSKAYA GES

Frunze SOVETSKAYA KIRGIZIYA in Russian 2 Nov 82 p 1

[Article by S. Ogibalina: "So the Dam May Stand for Ages"]

[Text] The last of the instruments for remote monitoring of the status of this special purpose structure was installed in the body of the Kurpsayskaya GES dam.

The Naryn has driven its cold glacial waters unhindered between the cliffs for ages. They couldn't block its way. The water wore down even the strongest stone. It seemed that nothing could stand in the way of the destructive mountain rapids. Nevertheless, a barricade was found. Man put the concrete dam of a hydroelectric station in the mighty river's path. It turned out to be stronger than stone. But even though it has become outwardly peaceful and has come obediently to a standstill in front of the handmade hulk, the river can do a lot of harm little by little.

Great significance is placed on observations concerning the status of dams and the shores they join together in world hydraulic engineering practice. How is the concrete inside the structure behaving? Outside? What forces are acting on the concrete blocks? According to what laws are they building up? Various instruments and sensors installed within the body of the dam--the eyes and ears of builders, operations experts and scientists--are called upon to answer these and other questions.

Almost 1500 instruments monitor the "state of health" of the Kurpsayskaya GES and dam. Every day the on-site observation sector for primary structures of "Naryngidroenergostroy" [Naryn Hydroelectric Power Construction] takes reading from 350 of them. On the basis of these data, specialists determine whether everything is in order and make recommendations to builders and operations specialists.

It is particularly interesting to observe the Kurpsayskaya dam because this engineering structure is in many ways unique. The fact of the matter is that in the mountains, on rapid mountain rivers, it is mainly gravity dams which are built. Their stability, as distinct from the lighter arch dams, is achieved through weight and mass. However, peculiarities

of local relief directed the designers toward the idea of using the so-called secondary arch effect in the dam design, creating a hollow type of gravity dam, a more economical one. Their proposal saved the state about R6 million, and now, when the dam is almost ready, the instruments should confirm the specialists' calculations.

Stepping carefully, picking out the most comfortable and reliable path in the approach passageway, the girls descended to the proper marking carefully, trying not to shake or bump inadvertently the precisely adjusted instruments.

Instruments are being installed in the body of the dam for the most diverse purposes. Certain of them are only necessary during the construction period. The service life of others is significantly longer. There are even "long-livers" which should still be functioning 100, 200 or more years from now. It is not simple to prepare all this instrumentation. Instrument testing and observation of their readings under conditions approximating reality to the highest extent are conducted for a minimum of half a year. And only after research engineer N. Sadovskaya of the scientific research sector of "Gidroproyekt" [All-union Order of Lenin Planning and Surveying and Scientific Research Institute im. S. Ya. Zhuk] Institute, chief of on-site observations Yu. Gashinskiy and other specialists give their approval to the installation, after technical L. Nigmatzhanova indicates on the blueprints the location for each instrument, only then are they given over to the installers and equipment operators.

The remote-sensing instruments, the last of which was recently installed, display static changes within the dam. It [the dam] might subside, deform or move away from the banks. The remote monitoring sensors will register the slightest changes in the dam (from a micron to 10 mm)--movement of the concrete blocks and other displacements--and warn of danger in time. Geophysical instruments, the installation of which is to be completed by the middle of November, will warn of other troubles on a larger scale. Cavitation sensors and many, many other instruments are daily, hourly, watching over the "health" of the dam so that it might be stronger than stone. So that it might stand for ages.

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## NON-NUCLEAR POWER

### FOURTH UNIT OF KURPSAYSKAYA GES ON STREAM

Moscow PRAVDA in Russian 15 Nov 82 p 7

[Article by V. Shirokov, correspondent for PRAVDA in Kara-Kul', KiSSR:  
"The Attraction of Kurpsay--Over the Map of the Construction Project"]

[Text] The last, the fourth unit of the Kurpsayskaya GES has been put on line. The first millions of kilowatt-hours of electric power have entered the United Power System of Central Asia and Kazakhstan. The fourth station of the Narynskaya water power cascade is in operation.

Even before winter, when the Naryn is calm, one feels what a tremendous, indomitable power lies beneath its deceptively gentle surface. And it is just this kind of violent mountain "steed" that people have been able to rein in, to put into a work harness. Today Kurpsay, and before that it was the At-Bashinskaya, Uch-Kurganskaya and Toktogul'skaya GES. And how many still lie ahead!

The start-up of any unit of a hydroelectric station is an entirely exceptional, by no means commonplace event. But when the last turbine comes to life, builders and installation workers experience a special feeling. This is it. The hour which they so persistently and stubbornly approached over many months or even years.

There are few people in the station building. But that is just for the moment. Soon some concrete worker or crane operator, foreman or engineer from neighboring sectors, seemingly without anything to do, will look. They will stand around a while and listen to the regular working hum of the turbine and go away satisfied. It is come to pass!

Yes, the work is accomplished, and just some 6 to 7 years ago, on this site on the right bank of the Naryn, stood a lonely wooden booth and a modest sign "Here will be the Kurpsayskaya GES." It seems that moving from that "will be" covered a distance of immense proportions. But the "Naryngidroenergostroy" collective's construction administration, having just completed construction of the Toktogul'skaya GES, the flagship of Kirghizstan power engineering, gave its word to build the Kurpsayskaya GES during a single five-year plan.

Domestic hydraulic power construction work had still not known such speeds. This "sprint" of the hydraulic engineers was insured by the experience and innovations already incorporated [into other projects], and which had already proven their effectiveness. These include the layer-by-layer "Toktogul'skiy" method of concrete pouring, high-speed tunneling, consolidated assembly of turbine assemblies and the famous workers' relay race.

In 1978, the Naryn was closed and the first concrete was poured for the foundation of the future dam. On the eve of the opening of the CPSU 26th Party Congress, the first unit of the station had already gone on line. The last unit provided power two months before deadline. The builders and installers approach this start-up with particular intensity. The quest was conducted at literally every work place. Concrete workers raised the crest of the dam to its 100-meter height in record time. The huge steel sluice was ready a week before start-up. Installation workers from "Spetsgidroenergmontazh" assembled the stator, rotor, both four-way holders and the thrust bearing at the same time. Victor Zemskiy's brigade assembled the rotor in 15 working days. This is twice as fast as the record set by installation workers when assembling the station's first unit.

It must be noted that the "magnetic lines of force" and the "workers' relay race" gave birth to an unheard of acceleration in energy. Installation workers traveled to supplier plants in Leningrad, Novosibirsk and Zaporozh'ye, while representatives of the enterprises were working at the assembly sites at Kurpsay. The chief engineers from supplier plants A. Krichevskiy, A. Vishnevskiy, fitters V. Yefremov, and I. Bezus and others displayed an enthusiasm for the work which was in no way inferior to the selflessness of the "indigenous" hydraulic engineers. Dozens of plant collectives from throughout the country experienced the attraction of Kurpsay.

Having entered into a socialist competition for the right to start up the completing unit, many brigades worked at speeds seldom seen. Thus, in 18 days, M. Pavlovskiy's brigade of installers assembled the stator. N. Gubanov's brigade completed installation of all auxilliary piping ahead of schedule. Engineers S. Osherovskiy, M. Mikhaylov, M. Antoshchuk and A. Troitskiy proposed brave and original engineering decisions while work was in progress. All work in the machinery pit was completed ahead of schedule and no one hindered the troubleshooters.

One characteristic detail. The labor upsurge [dedication] was such that during the "lightning" work dedicated to start-up, they decided not to single out any best [workers] to avoid offending anyone.

And start-up itself occurred modestly and prosaically. The "starters" in general do not appreciate fanfare and hullabaloo during such a moment. A regulator simply stood by the handle of the start-up mechanism that instantaneously controlled reactions to incoming commands and noise in the machinery, and the turbine started up.

The station's units will produce 2.5 billion kilowatt-hours of electric power annually, almost the cheapest in the country--1 kilowatt-hour from it costs 0.13 kopek in all. And the method of delivering the facilities in stages and the early start-up of the units have already conserved for the state more than 230,000 tons of conventional fuel.

Even though the finishing work has not been completed, the Kurpsayskaya GES looks very pretty. The dam's powerful shoulders spread apart the mountain ridges. Beyond the crest, the pacified Naryn flows slowly. Since the station will serve people for ages, measuring instruments designed for 100, 200 years and longer have been installed within its body.

Work at the station continues.

When we drove past a new site, we saw a modest sign, "The Tash-Kumyrskaya GES will be here." And it will be! The guarantee for this is the inextinguishable enthusiasm of the turbine creators and the hydraulic engineers.

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## NON-NUCLEAR POWER

### KURPSAYSKAYA GES JOINS CENTRAL ASIAN POWER GRID

Frunze SOVETSKAYA KIRGIZIYA in Russian 22 Dec 82 p 4

[Article: "Providing Light and Heat"]

[Excerpts] An important task was posed before the power engineers during the 11th Five-Year Plan: to bring production of electric power up to 1,555 billion kilowatt-hours. It was necessary to bring new facilities on line to solve it.

The power engineers of Kirghiziya are making a worthy contribution to the general state of affairs. We all live with the impression of the remarkable record set by them in domestic hydraulic power construction: they built the Kurpsayskaya GES, rated at 800,000 kilowatts, in 6 years. All 4 of its units were put into service ahead of schedule, and provide cheap electric power in the Central Asian power grid. The labor achievement on the Naryn is the result of the selfless labor of all who participated in the construction of the GES, first of all of such celebrated forerunners Fettayev's brigade of concrete workers and Sabirov's brigade of cliff climbing-installers.

The operations specialists are also greeting the holiday with labor successes. By 22 December, the annual plan for increasing electric power capacity was realized and by 25 December, the annual plan for generation will be fulfilled.

The collective "Kirgizenergozemont" is coping in excellent fashion with their difficult duties--main repair of the power generating equipment of the republic's GES [hydroelectric power station] and TETs [heat and electric power station]. This year it has won the All-union socialist competition among enterprises of the USSR Ministry of Power and Electrification four times.

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## PIPELINE CONSTRUCTION

### PIPE UTILIZATION IN PIPELINE CONSTRUCTION IMPROVED

Moscow PLANOVOYE KHOZYAYSTVO in Russian No 9, Sep 82 pp 124, 125

[Article: "Pipe Utilization For Construction of Oil and Gas Pipeline is Improved"]

[Text] In 1981, the editorial boards of the journals PLANOVOYE KHOZYAYSTVO, KHOZYAYSTVO I PRAVO, MATERIAL'NO-TEKHNICHESKOYE SNABZHENIYE, and SOTSIALISTICHESKIY TRUD in Tyumen' held a "round table" discussion of questions on conserving material and labor resources in the construction of main oil and gas pipelines. A report about the "round table" meeting was published in No 4 in 1981. Responding to the report were the Ministry of the Gas Industry, Ministry of the Oil Industry, Ministry of Construction of Oil and Gas Industry Enterprises, and USSR Gossnab and the USSR Gosplan. (see: PLANOVOYE KHOZYAYSTVO, No 9, 10, 12, 1981). In March 1982, the initiated dialogue continued (see: "Questions Await Resolution", PLANOVOYE KHOZYAYSTVO, No 5, 1982). The following is reported in response to the last publication by the Ministry of the Gas Industry, Ministry of the Oil Industry and Ministry of Construction of Oil and Gas Industry Enterprises.

The Ministry of the Gas Industry in order to more completely use pipes for construction of main gas pipelines has obliged the customers for construction to create working groups to determine the surpluses of unused pipes. Starting in 1982, the acts of the state commissions for inspection of the line segment of gas pipelines reflect the condition of the utilization of pipes obtained for construction.

The administration of material-technical supply of the ministry has been entrusted to calculate the pipe surpluses and include them in covering the demand for the next planned period.

Estimate of the pipe requirements by gas industry construction facilities is made based on the draft of a construction plan, the start-up of production facilities, the given planning documents, the need for delivery and standards of carry-over pipe reserve and is sent to the USSR Gosplan. The funds for pipes are allocated directly by the Ministry of Construction of Oil and Gas Industry Enterprises and other contracting organizations which draw up the orders for pipe shipments based on the orders of the construction organizations.

Taking into consideration that the assortment of pipes in the working plan often differs from the pipes indicated in the order specifications, the planning institutes have been instructed to have a more careful approach to compiling the order specifications.

A. N. Kolotilin, deputy minister of the gas industry

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The Ministry of the Oil Industry supports the suggestion that it is expedient to unite the services of the Ministry of the Gas Industry and the Ministry of the Oil Industry for reliable gas supply of the Surgut GRES. The USSR Ministry of Power and Electrification in December 1981 suggested that the Ministry of the Oil Industry and the Ministry of the Gas Industry transfer to the Ministry of the Gas Industry the gas pipelines and gas distributing stations which guarantee gas supply to the Surgut GRES. The Ministry of the Oil Industry confirmed its agreement. However, this question has not yet been resolved to date. In April 1982 a decision was made to construct in Surgut by Ministry of the Gas Industry a unit for refining the Urengoy condensate with production of motor fuels.

The separate nature of departments for communal services and trade found in Surgut is rightly noted. This causes definite complications both in creating the proper daily conditions for the residents, and for the supply of consumer goods. Consequently, the ministry believes that transfer of the residential fund to the ispolkoms of the city Soviets of People's Deputies, especially in such a large city as Surgut would eliminate these shortcomings. At the same time, one should transfer to these agencies the facilities having a social-cultural purpose together with the structural subdivisions of the ministry which service the residential fund and these facilities.

The availability in Surgut of a large number of trade systems of different ministries results in inefficient distribution of the trade and public nutrition enterprises, and in a number of cases, significant miscalculations in the demand of the population for goods. In order to improve the trade servicing of the municipal population, it is expedient to set up a city administration of trade which should be given the functions of coordinating the ministry's trade systems.

In the oil industry, as a result of the fast-rising volumes of drilling operations and extractions of oil in distant and sparsely populated regions of West Siberia, where there are no worker cadres, the watch-expedition method of organizing work has been used. The volumes of drilling operations performed by the watch-expedition method are constantly increasing. In 1981 this method was used to drill 3.928 million m in West Siberia. The plan for 1982 in the Glavtyumenneftegaz stipulates drilling 12.9 million m, including 4.8 million m by the watch-expedition method. This will be 37.7 percent. The technical-economic indicators for operation of the enterprises operating by the watch-expedition method in West Siberia are constantly being improved. Thus, in 1981, drilling for one drilling brigade in the Glavtyumenneftegaz was 50,500 m, and for drilling brigades working by the watch-expedition method, 43,000 m.



In December 1981, the USSR State Committee on Labor and the AUCCTU Secretariat by agreement of the USSR Ministry of Finances approved the standard statute on the watch method of organizing work. It stipulates the order for organizing of labor and rest, standardization and payment of workers wages of a number of sectors, including the oil industry that operate by the watch method. Based on this statute, a sector statute was developed with regard for the features of the oil production which is now in the stage of confirmation.

G. S. Popov, deputy minister of the oil industry

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The Ministry of Construction of Oil and Gas Industry Enterprises has created a permanent commission for rapid monitoring of the use and storage of pipes. In line with the commission's data, the board examined twice how the preliminary results for the approved measures are carried out in organizations within the jurisdiction. The ministry, after analyzing the pipe surpluses in the organizations under jurisdiction with regard for the 1981-1982 construction program, the availability of planned documents and production facilities of the construction organizations issued a suggestion about reducing the stocks of large-diameter pipes in 1981. At the same time, suggestions were made for transferring surplus pipes to other sectors of the national economy as a result of changes in the plans.

These suggestions were adopted by the Gosplan and the USSR Gossnab.

Improved utilization of large-diameter pipe will be fostered by the decision adopted at the suggestion of the ministry to build a system of gas pipelines in one corridor in a central direction. Under these conditions, construction of 73 percent of the route can be done year-round, while year-round work was only done on 44 percent of the route on the previously constructed pipelines. Currently, cost-accounting technological production lines have been set up by which uniform operation boundaries are established for the entire five-year plan. These production lines are being equipped with powerful special equipment.

In order to accelerate supply and improve the preservation of pipes during transport, their shipment to the northern Tyumen' Oblast by the northern sea route has been organized. It is planned to transfer 50,000 T of pipes more to navigation this year than in 1981.

Other measures are being taken aimed at improving pipe utilization:

A decision has been adopted jointly with the trade union central committee: "Supplementary measures for guaranteeing material incentives for economical use of pipes, materials, and their timely removal from completed construction sites for workers of construction/installation organizations";

The "Instructions for technology and organization of shipping, loading, unloading and storing large-diameter pipes in oil and gas pipeline construction" have been approved;

The program for training and improving the skill of worker cadres includes a section on careful handling of pipes and their economical consumption.

At the same time a number of questions are still unresolved.

Pipelines not provided with planned-estimate documentation by 1 July are still included in the ministry's construction plan, which results in additional haulage and formation of pipe surpluses at individual construction lots.

Yu. V. Andreychev, member of the board of the Ministry of Construction of Oil and Gas Industry Enterprises,

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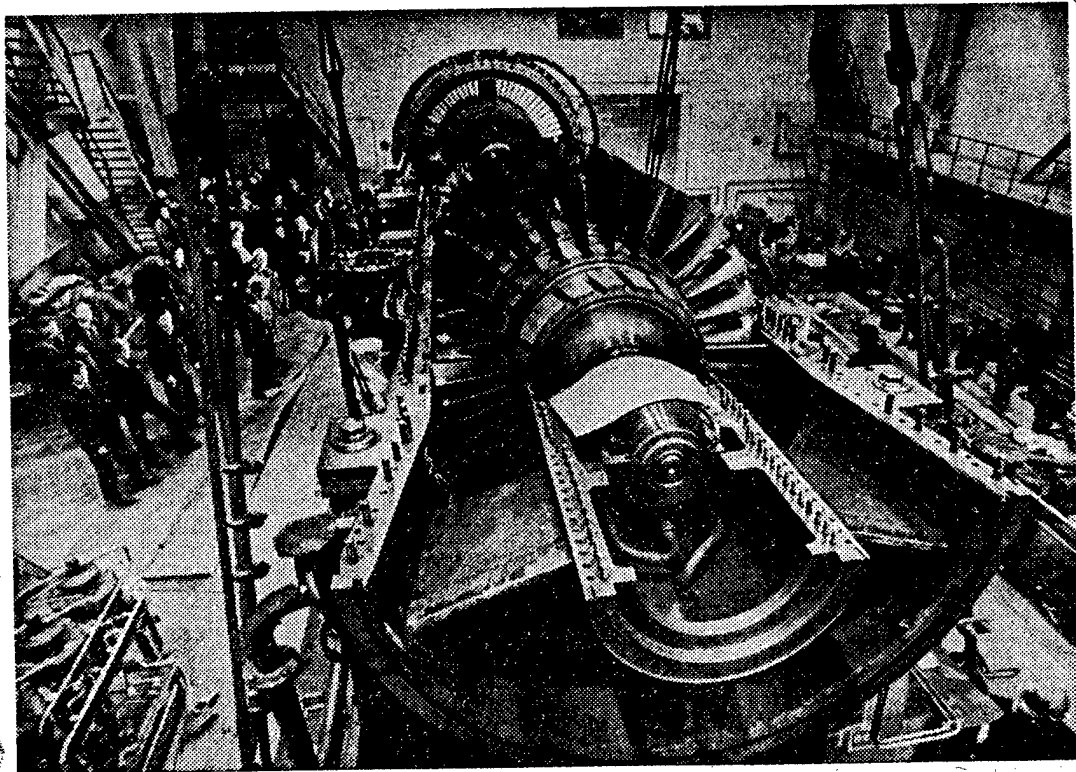
CSO: 1822/32

## PIPELINES/COMPRESSOR STATIONS

### GTN-25 GAS TURBINE UNIT TESTED

Leningrad LENINGRADSKAYA PRAVDA in Russian 25 Dec 82 p 2

[Article by A. Tabakov: "First-Born on the Test Stand!"]



GTN-25 on the Test Stand

[Text] "Nevskiy zavod" waited for this information impatiently, and tried to bring it closer with all their efforts. Every now and then they asked those who were communicating with Gryazovets: "How is it going there, will it be soon?" The experimental gas-turbine units which has passed a course of tests on the stand in Novgorod, were then disassembled and sent to the active gas pipeline in the Vologda Oblast where they will be tested in a working regime, under load.

At night from 20 to 21 December, the telephone rang in the association:

"There is start up!"

This news immediately caused joy among the workers of the assembly shop of "Nevskiy zavod." The brigade of L. D. Babukov completed an assembly of the first, series unit GTN-25 which was to be shipped to the test stand on 25 December. The success in Gryazovets which was attained during the socialist competition in honor of the 60th anniversary of formation of the USSR elicited a response reaction in the shops.

Yesterday morning the powerful bridge crane siezed the last 45-ton unit with a special attachment and lowered it onto the railroad platform car. Having travelled 20 meters on the steel track, it entered the action zone of another lifting mechanism. Within another hour the enormous unit was placed on the test stand, where a power turbine and generator had been assembled before this. The Nevskiy machine builders are fulfilling the most important aspect of socialist competition of the anniversary year.

Several days more will pass. The mechanics and assemblers will bring the pipelines to it, connect the system of monitoring and automatics, and give the command "attention, start-up!" The first series unit will make test revolutions, will pass the plant exam, and then will be sent to the Urengoy-Pomary-Uzhgorod route where it will serve for a long time and faithfully.

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## PIPELINES/COMPRESSOR STATIONS

### AVIATION MOTORS CONVERTED FOR GAS PIPELINE USE

Moscow TRUD in Russian 6 Oct 82 p 1

[Article by Ye. Ukhov, TRUD correspondent: "Ground Routes of Aviation Motors"]

[Text] The collective of the Kazan Order of Lenin Motor Construction Association has started series fabrication of gas-turbine engines for the main gas pipeline Urengoy-Uzhgorod.

This association manufactures modern, powerful, economical and reliable aviation engines. Recently a new, not quite common word for this production profile was added to their flattering characteristics: ground. The task set before the motor builders was precisely to bring the product down from the skies to the earth. They had to begin fabrication of drives for gas pumping units on the route of the main gas pipelines. They had to do this on short schedules, without allowing arrhythmia in the shipment of engines to Aeroflot.

The deputy head of the design department G. Bikmullin unrolled a map with the plan of the gas pipeline route West Siberia-West Europe on the table. It looks like the neck of a guitar, the pipelines extend as strings, intersected at equal intervals by compressor stations. The Kazan items which the compressors will use to maintain the necessary gas pressure in the pipe will be installed on them in a ring, five for each line.

The manufactured engine in its technical and operating parameters exceeds the domestic analogs. Weighing only 6 tons, it has great power and its fabrication costs significantly less.

In order to "seat the engine on the pipe" it was necessary to put into production dozens of basically new technological designs, to plan and to manufacture hundreds of types of special fittings.

"Two months ago at the meeting where the socialist commitments were adopted for fulfillment of the important assignment, the collective outlined an intensive program for assembly of the new items," the secretary of the association party committee N. Myntsev told me on the way to the assembly shop. "Many shops are now working under the motto: not a minute of delay manufacturing and producing the parts for the gas pumping unit. Short schedules have been developed for

shipping the sets and assembly parts. It should be said that this motto has not yet been disrupted even once."

We found the brigade of Communist labor of mechanics Almaz Fazylov at the assembly section. He headed it quite recently, mainly when the first drive was being assembled. The mechanics of Viktor Gushchin, chairman of the council of brigade foremen of the shop are conducting the assembly here in white coats. The important operation of assembling the starter has been entrusted to the production veteran M. Karpov.

There is a museum of labor glory at the plant on whose stands samples of production have been assembled which were manufactured at the enterprise during its 50 years of operation, starting with the star-shaped engines for the plywood U-2. Soon the exhibit will have a new display, it will be the engine which has made a successful landing from the blue air routes to the route of the blue fuel.

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## PIPELINES/COMPRESSOR STATIONS

### GTN-25 GAS TURBINE MANUFACTURE PROCESS DESCRIBED

Moscow EKONOMICHESKAYA GAZETA in Russian No 43, Oct 82 p 4

[Article by A. Kovalev, and A. Shevtsov: "Technology for the Urengoy-Uzhgorod route"]

[Text] The collective of the production association "Nevskiy zavod" sent the first gas pumping machines 25 years ago to the gas pipeline Stavropol'-Moscow which was being built at that time. Since then this direction in the work has become one of the basic for the Neva machine builders. More than a thousand units are operating on the gas trunklines of the country and abroad. About 80 percent of the gas is pumped on USSR pipelines with the help of improved machines manufactured in Leningrad. The group of workers of the association was awarded the 1965 Lenin Prize for creation of the gas pumping unit.

This is history. By the way, it is history which has direct relationship to modern times: we saw the gas pumping unit with ordinal number 4 on the test stand in shop No 8 of the main plant. This is the latest word in domestic and world machine construction. The creation of the machine used highly effective inventions which are protected by 25 certificates of authorship. This significantly improved the operating qualities of the unit and its technological effectiveness. It does not differ in weight from the series developed machine GTN-10, but it exceeds it in power 2.5-fold. The power of the new supercharger is 25,000 kilowatts. Two of these experimental machines have already been successfully operating for a long time at the gas pumping stations in the region of Vologda, one has been installed at the experimental compressor station at the association branch in Chudova, near Novgorod.

The main units GTN-25, having passed the tests, proved to be the most economical of all the previously manufactured similar machines. The planned labor intensity of the first four models was 180,000 norm-hours. After corrections obtained from the testers, the labor intensity of the series machine will be cut in half because of partial change in the design, improvement in technology and high mechanization of production. Plasma metal working is widely used here and the most modern welding is employed.

A great advantage will be gained during construction of the pipelines. At the current pumping stations, eight gas turbines with power of 10,000 kilowatts have been installed. It was consequently necessary to build large buildings and to

install eight foundations. At the pumping stations equipped with the GTN-25, only three foundations are needed. According to the estimates of economists, every fifth station equipped with the new machines will be built with a conservation of capital investments. Each gas pumping unit will provide the national economy with an economic effect equal to a million rubles.

The previously manufactured turbines corresponded to the level of world models. Over 90 percent of the products of the association were awarded the state sign of quality. Turbine GTN-25 is unique. It initiates the "lineage" of a new generation of gas turbine superchargers. This turbine will be the basis for units with power of 40,000 and 60,000 kilowatts. All the work associated with creation of the GTN-25 is headed by the chief designer of gas turbines, doctor of technical sciences Andrey Leonardovich Kuznetsov.

The first experimental GTN-25 was assembled by the collective of workers headed by L. Babukov. N. Dubinin, D. Sil'kov, A. Kuznetsov, I. Kuzlov, P. Birikov and N. Mashkovtsev worked with him. Now the first series GTN-25 has been finished. There is no doubt that the quality of assembly will be excellent.

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## PIPELINES/COMPRESSOR STATIONS

### BRIEFS

TESTING OF GAS PUMPING UNITS--Leningrad--Laying of a special gas pipeline needed to test the gas pumping unit has been completed. The builders have brought the route to the manufacturer, the association "Nevskiy zavod" imeni V. I. Lenin, under the municipal trunklines and over the bottom of the Neva in the shortest time. [Text] [Moscow SOVETSKAYA RUSSIYA in Russian 27 Oct 82 p 1] 9035

WORKER CONVENIENCES--Mironovka, Kiev Oblast--Additional conveniences have been made for the builders of the Urengoy-Pomary-Uzhgorod gas pipeline on the trunkline route near the regional center of Mironovka. A comprehensive reception station for communal services has been opened in the base settlement. The ispolkom of the local soviet has been concerned about the collective of route workers. An area for a trailer city was set aside for them in advance. A cafeteria was equipped, and a special brigade did all the work for build-up. Especial attention was focused on the families of the route workers. Places were prereserved in the kindergartens and schools of the regional center for the young inhabitants of the settlement. [Text] [Moscow IZVESTIYA in Russian 16 Nov 82 p 2] 9035

COMFORTABLE WORKER SETTLEMENT--Kazan--A comfortable living settlement was set up for the operators of the Urengoy-Pomary-Uzhgorod gas pipeline not far from the regional center of Shemordan in the Tatar ASSR. Here there will be a powerful compressor station, and the personnel servicing it and other technical equipment will settle in one-and two-story cottages which have been provided not only with a complete set of city conveniences, but also comfortable furniture. A store, kindergarten, school, cafeteria, club and fruit and vegetable warehouse will be built in addition to housing in the settlement. The general contractor, SMU-3 of the trust "Kazan'khimstroy" intends to finish the station and the settlement ahead of schedule. [Article by Yu. Alayev] [Text] [Moscow IZVESTIYA in Russian 3 Nov 82 p 2] 9035

GAS PIPELINE TURBINE--Sverdlovsk--Manufacture of the turbine for the Urengoy-Pomary-Uzhgorod gas pipeline was completed ahead of schedule by the collective of the association "Turbomotornyy zavod" imeni K. Ye. Voroshilov. The unit is capable of pumping over 50 million m<sup>3</sup> of gas everyday. The new machine weighs half of the previous models, and high plant readiness of the blocks makes it possible to assemble it in place in a shorter time. [Text] [Moscow SOVETSKAYA RUSSIYA in Russian 1 Dec 82 p 1] 9035

WORKER SETTLEMENT--Cheboksary, 4 Sep--The first buildings of a new large settlement have been built close to the regional center, the village of Krasnoarmeyskiy. These buildings are designed for the service personnel of the powerful gas compressor station which will be put into operation on the gas trunkline route Urengoy-Uzhgorod. Apartments with all the city conveniences have been planned. [Article by Yu. Knyazev, outside PRAVDA correspondent] [Text] [Moscow PRAVDA in Russian 5 Sep 82 p 1] 9035

PIPELENGTH CARRIERS--Ukhta, Komi ASSR--The manufactured machines for shipping pipelengths to the route of the oil and gas pipelines has been developed in Ukhta. The caterpillar pipelength carrier is capable of carrying pipes weighing up to 20 tons and of any diameter. The first of these machines have been sent to the builders of the gas pipeline Urengoy-Pomary-Uzhgorod. [Text] [Moscow SEL'SKAYA ZHIZN' in Russian 16 Oct 82 p 1] 9035

ROAD SLABS--Khabarovsk--Manufacture of special slabs has been developed at the Khabarovsk plant of bridge reinforced concrete designs. They will be used to lay approach roads for the Urengoy-Pomary-Uzhgorod gas pipeline which is under construction. A large batch of these items has been sent from the shores of Amur to the Tyumen Oblast. The Far East workers will supply the builders of the route roads of the gas pipeline with over 120,000 m<sup>2</sup> of slabs before the end of the year. [Text] [SOVETSKAYA LITERATURA in Russian 3 Oct 82 p 1] 9035

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## ENERGY CONSERVATION

### CEMA ENERGY CONSERVATION MEASURES DISCUSSED

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 11, 1982 pp 28-31

[Article by Sergey Gortinskiy, Scientific Editor of the Bulletin of the CEMA Standing Commission on Collaboration in the Field of Electric Power: "Saving Fuel and Electrical and Thermal Energy Is a Nationwide Task"]

[Text] The long-term specific-purpose program for collaboration in the field of fuel, power and raw materials calls for:

maximum involvement in the economic turnover of a nation's own resources, primarily solid types of fuel (including low-grade fuels) for generating electricity and for releasing energy for industrial use, but also hydroelectric resources;

the accelerated development of nuclear power facilities, based upon cooperation and specialization in the production of equipment for AES's; and

the rational use and economizing of fuel and power resources through the introduction of new engineering solutions and operating processes that are less energy-intensive, a rise in the efficiency of energy-using installations, further development of the combined generation of electricity and heat, the more complete use of secondary energy resources, and a substantial reduction in energy and fuel losses in all branches of the national economy.

Based upon this, the CEMA Standing Commission on Collaboration in the Area of Electric Power specified for 1982-1983 a set of measures for multilateral scientific and technical collaboration aimed at saving fuel during the generation of electricity and heat, reducing losses of electricity in the power grids, and creating gas-fired steam installations of 250 MW capacity and higher with high-head steam generators and the gasification of solid fuels under pressure within the cycle. The development of progressive methods for preparing for and intensifying the processes of burning low-calorie solid fuels and forming large district-heating systems, with the transmission of heat over great distances and the storage of heat, are of great importance. Much has been done also to use existing TETs's as flexible and condensation electric-power stations for supplying heat and for optimizing the long-range development of the United Electric-Power Systems of the CEMA member countries and to work out scientifically a number of other measures that will help to save heat, fuel and energy.

As is known, one of the most important elements of saving that will support development of the productive forces and technical progress is the fuel and power complex. Therefore, its growth and further improvement is being given special attention in five-year plans and long-range programs for the development of each CEMA member country.

In Bulgaria, for example, the Bulgarian Communist Party Central Committee and the BNR [Bulgarian People's Republic] Council of Ministers adopted a decision in accordance with which the Ministry of Power and Electrification is charged with control of the rational use of fuel and electricity in industry, transport, construction and agriculture, in addition to the generation and distribution of electrical and heat energy.

In Hungary, a government program for scientific and technical research, capital investment and additional economic and administrative measures for the purpose of saving energy in all branches of the national economy has been developed within the framework of the five-year plan.

In the GDR, a Directive of the Politburo of the SED [Socialist Unity Party of Germany] Central Committee and the Council of Ministers has set the task: in 1985 save fuel in comparison with the 1980 level that will correspond to an electric-power equivalent on the order of 65 million tons of ordinary brown coal. A Central Power Commission and the working group on, "The Rational Use of Energy," has been formed under the GDR Council of Ministers.

In Romania, a decree on developing the fuel and power base and on making more rational use of fuel and energy has been adopted.

In the Soviet Union, the "Main Directions for the Economic and Social Development of the USSR During 1981-1985 and During the Period up to 1990" require that a saving of fuel and power resources of 160-170 million tons of standard fuel equivalent be provided for during the five-year plan.

In Czechoslovakia a State Specific-Purpose Program for the Rational Consumption and Use of Fuel and Power has been developed. It calls for a saving in 1985, in comparison with the 1980 level, of 12.4 million tons of standard fuel equivalent and for an allocation of the capital investment necessary for this purpose.

Much attention is being paid to drawing hydroelectric-power resources into the economic turnover and to erecting GES's, as well as to making rational use of fuel, in CEMA member countries. The goal is the creation of a favorable regime for operating TES's and AES's and a substantial improvement in their technical and economic indicators. In many European CEMA member countries, the construction of GAES's [pumped-storage electric-power stations] for operation during peak and semipeak portions of the load curve is planned.

The accelerated development of nuclear power has ever-increasing importance for saving and making rational use of fuel and power resources. The Master Scheme for the Long-Range Development of the United Electric-Power Systems of CEMA Member Nations During the Period up to 1990 calls for the erection in European CEMA member nations and the Republic of Cuba, with the technical cooperation of the USSR, of nuclear power stations that will enable 60-70 million tons of standard fuel equivalent per year to be saved. A broad program for building AES's has been developed in the USSR.

The main direction for developing power engineering in CEMA member countries during the current decade is the concentration of electrical generation at high-capacity power stations. An appreciable reduction in fuel consumption per kWh at the switchboard will yield an increase in power generation for equipment with progressive technical and economic indicators. This refers to power units of 300, 500, 800 and 1,000 MW.

Still another important area is the introduction of steam and gas installations with high-head steam generators of 250 MW capacity that work on gas fuel. In comparison with steam-power plants they enable a saving of 7-8 percent of fuel and reduce specific capital investment considerably. The use of 300-, 500- and 800-MW turbines with improved flow passage of the low-pressure cylinder increases their economy by 1 percent. The use of low-pressure mixing-type regenerative preheaters in the thermal systems of units of said capacity raises the turbines' economy by 0.2-0.3 percent in comparison with tube-type preheaters.

The use of a more economical mechanical system for heating and ventilating main TES buildings will also help to save energy. The creation and introduction of auxiliary equipment that is technically more advanced--water-packed ring pumps instead of ejectors for pumping the air out of turbine condensers, evaporators for instantaneous boiling, and so on--will help to reduce energy consumption for in-house needs.

For purposes of more effective use of installed equipment at existing TES's, the conversion of a portion of the 150- and 300-MW units to operation at increased steam temperature is called for. This will increase the units' economy by 0.5 percent. Modernization of the flow passage of 100- and 200-MW steam turbines and of heat-exchange surfaces in water-cooling towers, use of a method for burning mazut with a minimum of excess air, and an increase in the flexibility of existing units will have a positive effect on the rational use of energy resources.

Still another important source for saving fossil fuels is the further development of district heating. The fact is that the combined production of electrical and thermal energy at TETs's greatly reduces specific fuel consumption in comparison with separate generation.

It is also desirable to rebuild 150- and 300-MW condensation units in order to involve them in district heating. In the Soviet Union, for example, it is planned to modernize about 100 turbines that have a total capacity of 20 million kW in the next 15 years. This will enable an economic benefit on the order of 130 million rubles and a saving of 5 million tons of standard fuel equivalent per year.

Substantial possibilities for fuel savings are opened up by the rejuvenation (disassembly) and rebuilding of worn and obsolete TETs equipment and of industrial and municipal-services boilers.

Research has indicated that, with the development of nuclear power, the problem of covering the semipeak portion of the load curve has been aggravated. In this connection, it is necessary to reorient TETs's that operate on fossil fuels to the category of flexible electric-power stations. In the first stage, they can be erected without new equipment. Flexible steam-turbine TETs's can operate on all types of fossil fuels that are used at thermal stations with a specific consumption of 220-230 grams of standard fuel equivalent per 1 kWh, even on solid fuel, which is impermissible for any other types of flexible stations. In the USSR work has already started on preparation for converting existing TETs's to the flexible

category. As specialists' analyses indicate, full automation of the processes of regulating district-heating centers will enable heat consumption to be reduced by 15 percent.

Significant reductions in losses of heating during distribution and delivery to consumers are related also to the use of more progressive heat-insulating materials, particularly mineral and glass fiber and higher-quality porous concretes.

In apartment houses and industrial buildings, these losses occur basically as the result of the permeability of windows and doors to air and to failure to observe operating discipline during the production and assembly of constructional structure. The main path to solving the problem is to increase the thermal insulation of constructional structure and to develop and use more improved materials. Further improvement of automatic regulation of central heating systems also is called upon to play a greater role.

In considering this, CEMA member countries have planned a series of measures. In the USSR, for example, in accordance with a specific-purpose scientifically integrated program, the 11th Five-Year Plan calls for measures to create new, highly effective thermal insulation based upon polymer-concrete mix materials, with a view to reducing heat losses in heat conduits to a normal level.

A considerable reserve for satisfying industry's needs and household requirements for heat energy of low potential is the use of secondary energy resources in metallurgy, the chemical industry and some other branches of the economy. In the Czechoslovak Socialist Republic, secondary energy resources are to be used for heating and drying purposes, for preheating process water, and in agriculture.

In the MNK [Hungarian People's Republic], the USSR and the CSSR [Czechoslovak Socialist Republic] work is being done on the use of geothermal energy, preferentially in agriculture in the MNK. In the USSR a geothermal electric-power station (GeOTES) of 11-MW capacity has been erected. It is planned also to build there a GeOTES of 200-MW capacity. In the European part of the country, three experimental GeOTES's of 10 MW each, using artificial underground circulation systems, are called for. The country will also develop systems for hot-water supply and for air conditioning housing and public buildings. In Central Asia's agriculture, these systems will be based on the use of solar radiation. An experimental solar electric-power station (SES) of 5-MW capacity is being erected. In the near future several experimental and test photoelectric-power stations, which provide for the conversion of solar energy into electricity, will be created.

Further expansion in the scale of parallel operation of energy systems, which will enable use of the intersystem effect to be increased, is playing a role of special importance in solving fuel and power problems in the modern era. The installation of additional sources of reactive capacity of synchronous compressors and static capacitors will help to reduce losses in the grids. Much can also be done by converting the grids to higher voltages, replacing the wires of power transmission lines with ones of greater cross-section, and reducing the number of voltage levels in medium- and low-voltage grids. Major tasks are to be faced in the field of optimizing the installed capacity of transformers at substations, raising their efficiency, and improving operations and the regulation of voltage and of reactive capacity by the wide use of computers.

An important area is the saving of electricity that is used for lighting. For this purpose it is necessary to develop and introduce progressive norms for illumination, as well as standards in the area of electric-lighting equipment, and to introduce economical schemes for power supply in this field. Also effective are the use of twilight switches and automatic regulators, a rise in the luminous output of bulbs, and the wide use of luminescent high-pressure sodium and halogen bulbs. A number of measures is planned for wide conversion to luminaires for local lighting at enterprises and in the premises of administrative and other buildings and a reduction in the specific values of installed capacity for corridor, stairway and display lighting of department stores and other trade premises.

In order to accomplish these and other tasks, the CSSR has adopted an order aimed at reducing the consumption of electricity in the trade-organization sphere, in social buildings and in the field of household lighting. The standard, "Street Lighting," which calls for rebuilding the illumination of communities with more than 10,000 residents, and places with smaller populations where there are first-category roads, has been introduced.

In the Polish People's Republic, the installation of 30 million luminescent bulbs with improved phosphors and 1 million high-pressure sodium bulbs is called for in 1981-1985.

The problem of saving fuel, power and fuel energy occupies an important place in the operating program of the CEMA Committee on Scientific and Technical Collaboration. It calls for the development of technical solutions for the rational use of fuel and power in furnaces, boilers, driers and heat-exchange equipment, and also for the creation of boilers with fluidized beds. Further improvement in the monitoring and control of electrical consumption in industrial processes and departments and at industrial enterprises, the development of norms for the consumption of fuel and power by energy-intensive equipment that are unified for CEMA member nations, and effective measures for using the waste heat of thermal and nuclear electric-power stations are planned. Great attention is being paid to secondary energy resources for the centralized supply of heat for communities and hothouses.

A set of measures for reducing fuel and energy consumption in ferrous metallurgy is planned. This refers to the wide use of reducing gas in blast furnaces and units for the direct reduction of iron.

The introduction of complexes for autogenous smelting of copper and nickel sulfide concentrates, which yield savings of 75-78 percent of the energy, and of oxygentorch smelting, which enables 27 percent of the copper to be saved, has an important place in nonferrous metallurgy. Through Cuisette smelting, a 35-57 percent reduction in specific fuel expenditures is being achieved at lead and copper-zinc production facilities. With oxygen-enriched blast at furnaces and preheating blast at 400 degrees, this consumption is reduced 10-18 percent.

For the more effective use of gas, standard procedures for monitoring tests of burner devices and specifications for them have been prepared. They have been unified for all CEMA member nations. Effective burner designs have been created: in the USSR--thermal diffusion burners which reduce gas consumption 6-8 percent; in the Hungarian People's Republic--high speed and ejector burners with automatic control; in the Czechoslovak Socialist Republic--burners with active air jets; and, in the GDR--burners with high-speed adjustment.

In the building-materials industry it is planned to reduce specific fuel consumption by increasing the share of cement clinker made by the dry method, reducing the moisture of the slurry at plants that operate on the wet method, and eliminating heat losses from kiln exhaust gases. Fossil fuel will be superseded by introducing the radiation-chemical method of obtaining portland cement and by using electrical technology during glass production.

At present, industry is the basic customer for fuel and electricity in CEMA member countries. In the USSR, for example, its share is up to 62 percent of total consumption. Analyses indicate that the realization of measures to save energy in the USSR's industry (apparently the same effect can also be obtained in other CEMA member countries) will in 1981-1985 require capital investment of 30-80 rubles (60 rubles on the average) per 1 ton of standard fuel equivalent. At the same time, according to preliminary data, 2-fold to 3-fold more resources would be required for its extraction and transport (taking into account expenditures on upkeep of the extraction).

In conclusion, it should be noted that, for maximum savings of fuel, electricity and heat, further improvement in the planning and supervision of the national economy and involvement of the broad mass of workers in the struggle for its rational use are of paramount importance. In the GDR, for example, the Deputy Chairman of the Council of Ministers--the head of the Central Power-Engineering Commission--will confer on combines and enterprises, and, since 1980, also on communities and cities, for good results in organizing the power-engineering activity and in saving energy, the title of enterprise or rayon that has achieved model indicators in energy saving, with inscription in the Book of Honor and payment of a monetary bonus. Today about 600 enterprises and institutions which use about 45 percent of the energy consumed have been awarded this title.

The nationwide organization of nationality and branch competitions in saving energy resources, wide propaganda about them, and rivalry in this field in absolutely all areas of consumption are of great importance.

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